VOL. XXIX. CLEVELAND, O., APRIL 21, 1904. No. 16.

WINTER NAVIGATION ON LAKE MICHIGAN.

The accompanying illustrations will give the reader a fair idea of what winter steamboating was like on Lake Michigan the past three or four months. On February 9 the car ferry

ANN ARBOR NO. 1 IN THE ICE IN LAKE MICHIGAN.

Ann Arbor No. 1 cleared from Kewaunee, Wis., for Frankfort, Mich., in command of Capt. B. F. Tuelledge, with O. Grimm first mate, C. McCauley second mate, P. H. Doyle as chief and W. Boyce as second engineer. When about a mile in the lake she was caught in a heavy ice shove, from which she was unable to extract herself, and was carried south a distance of over 8 miles, the ice in the meantime accumulating under the steamer until it found anchorage on the bottom in about 5 fathoms of water. The moving field then began crowding the boat to such an extent as to raise her 6 ft. above her original draught. On the same date car ferry Ann Arbor No. 3 cleared from Frankfort, Mich., for Manitowoc, Wis., in command of Capt. H. F. Rydt, with Chas. Fredrickson as first mate and H. Erbe as second mate. Jos. P. Breuer as chief engineer, who was substituting in Mr. T. J. Harkins' place (and to whom the Review is indebted for the photographs), and H. F. Fax as second engineer.

On February 10, in the afternoon, the No. 1 was sighted blowing signals of distress. The No. 3 immediately started to her assistance, endeavoring to release her, and when earnestly engaged in this attempt the channel astern of her closed and again started the whole field moved, imprisoning the No. 3 and leaving her in identically the same predicament as the No. 1 was in. The two vessels remained in this position for three weeks, when they were released on March 4.

ANN ARBOR NO. 3 IN THE ICE IN LAKE MICHIGAN.

The ferries had plenty of fuel and provisions aboard to last them at least two months, so none suffered from cold or hunger.

Lake Michigan was frozen from shore to shore, and remained so for over five weeks, the ice, where it was not windrowed, ranging from 8 to 16 in. in thickness. During the latter part of the winter it had moved from the east here, leaving from 15 to 20 miles of open water, but crowding the ice to the westward, making navigation still more difficult. The ice in Lake Michigan has now disappeared entirely with perhaps a small amount still hanging between the islands and the east shore, and at the strait of Mackinac.

LIVERPOOL SHIPPING LETTER.

LIVERPOOL, April 11.—Few steamship lines can point to such rapid developments as that shown by the Nelson Line, which has its headquarters at this port. It is only a few years since they commenced their ship owning career with the Highland Scot, and now including three vessels building, the fleet consists of fourteen up-to-date steamers, specially designed and built for the requirements of the River Plate trade. Of the tonnage building the first vessel to be commissioned is the Highland Watch, which sailed from Liverpool on Saturday (April 9) on her maiden voyage. Her builders are Messrs. Russell & Co. of Port Glasgow, who built the first vessel which flew the Nelson Line flag. At present they have in hand the Highland Harris, completing, and the Highland Heather, which will be launched towards the end of April. The advent of these three vessels, especially as they have excellent accommodation for passengers, and that on a far larger scale than their predecessors, marks an important era in the progress of the Nelson Line. The Highland Watch has a length of over 400 ft., with a beam of 52 ft. 6 in., and a depth of 29 ft. 6 in. Her gross tonnage exceeds 5,000 tons, and she is capable of carrying 7,250 tons deadweight. The cold storage capacity is equivalent to 90,000 carcases of mutton, which can be increased to 100,000 if necessary. The passenger accommodation has received special care, and a notable feature of the ship is that she is fitted with Wood's patent berths, which enables the upper berths being easily negotiated, and the wonder is, considering the difficulty and risk which many persons experience in making use of the upper berths, that they are not generally adopted on passenger vessels. It is safe to predict that this new ship will prove a valuable addition to the splendid fleet of steamers which now comprise the Nelson Line.

The Liverpool Underwriters' Association have favored me with their monthly report showing the casualties to vessels of 500 tons gross register and upwards which have been posted in the Loss Book during the month ended March 31. They number 433, against 560, and 413 for March of 1903 and 1902, respectively. The total losses included four sail with a total tonnage of 5,383 tons, and two steamers with a total tonnage of 7,280 tons, British; and six sail, with a total tonnage of 7,460 tons, and six steam, aggregating 9,310 tons of foreign registry. The partial losses number 415. While the casualties for the month under review compare favorably with the number of those occurring in the corresponding month of the three preceding years, the year 1903 will long be remembered by underwriters generally as a time of great loss and anxiety. It commenced with disaster, and disasters continued throughout the whole of it, not in one quarter only, but throughout the world. Terrific weather in the Atlantic, bad weather on the American lakes, collisions, cotton claims, and fires on shipboard, combined to make the year one fraught with dismal experiences. The March casualties are given as follows: Collisions, 155; strandings, 108; weather damage, sixty-three; damage of machinery shafts, etc., fifty-three; fires and explosions, seventeen; founderings and abandonments, six; missing, four, and other casualties, twenty-seven.

There is just now some enterprise being shown in dealing with the American mails at Plymouth. In a recent letter I mentioned that the American Line had decided to make Plymouth the first port of call on the eastward journey of all their Atlantic mail steamers, as has been done by the steamers of the Hamburg-American and the North German-Lloyd lines. For the accommodation of the passengers and mails arriving at Plymouth on Saturday by the St. Louis, the London & South-Western Railway Co. provided a new and luxuriously fitted corridor vestibuled train, which was worked through from Plymouth to London, a distance of about 231 miles in 4½ hours. This service will be the longest break ever attempted by the South-Western Co. and will also, it is claimed, rank as the longest regular non-stop railway run in the world.

The annual meeting of the Cunard company's shareholders held this week was a very harmonious one, notwithstanding that several matters of great import to the company were dealt with by Lord Inverclyde in his review of the company's operations during the year. The chairman made the interesting announcement that the decision to adopt the turbine system in the case of the two new fast mail and passenger steamers was arrived at with the cordial consent of the admiralty. This it is difficult to imagine would be withheld in the present circumstances, because the success or non-success of the experiment will be of far reaching importance to the British royal navy. Another important observation of Lord Inverclyde had reference to the entry of the Cunard Line into the Mediterranean trade, and the arrangement for a fortnightly service from Trieste and Fiume, concluded with the Austro-Hungarian government. He strongly resented the action of the two German lines in stopping all passengers on the frontiers of Germany, who wished to go by Cunard steamers from Liverpool and either sending them back to their homes, or insisting upon them taking tickets by the German steamers. The attention of the two German lines had been officially called to this "irregular and unconstitutional exercise of their powers, but without avail." Nor were his remarks less emphatic and condemnatory in dealing with the proposed alteration of tonnage measurement by the Mersey Docks and Harbor Board. The threat to sail the passenger and mail Cunard boats from some other port, if the company was further hampered by higher dues and other disadvantages as compared with other British ports, may not turn out to be a piece of bluff as some suppose it to be. The dock board bill has been so altered in committee as to render it certainly destructive to the trade of the port, should it become law. It has no friends outside the dock board itself, and from the opposition it is arousing it will surprise no one if it is again withdrawn. Certainly this would be the most dignified way out of the difficulty for the dock board. Evidently the shareholders endorsed the views held by Lord Inverclyde upon these matters, for when the report of the directors was submitted for adoption not a single question was asked the meeting, which only occupied about a quarter of an hour, being characterized by perfect unanimity.

The models of the latest Cunarders, the Slavonica and Caronia (building), together with one representing the two fast liners to be constructed under the agreement with the British government, will be conveyed to America by the Saxonia, which sails from the Mersey for Boston on Tuesday next. These together with models of most of the notable steamers built since the establishment of the Cunard Line in 1840, will be included in the shipping section of the St. Louis Exhibition, and will undoubtedly attract wide attention.

From the British Colonial office report on the banana export trade of Jamaica, it seems clear that the subsidized West Indian steamers have proved a failure in developing the export trade of the West Indies to this country. The report says, "It cannot be said that the expectations as to the export of bananas, somewhat freely held out on the establishment of the Imperial Direct Line of steamers have been

altogether realized. It is to be noted that practically the whole of the increased volume of the banana trade has been with America in vessels which, though receiving postal subsidies from the United States government receive no help from the revenues of Jamaica, and not with Great Britain, by the vessels of the line subsidized by both the Colonial and Imperial governments. The subsidy is £20,000 a year by Jamaica, and £20,000 by the United Kingdom. The Imperial Direct West India steamers have carried to this country regularly over 20,000 bunches of bananas on every voyage home, and thus have fulfilled this part of their contract, but the service has not developed so rapidly as was at first thought likely.

Liverpool commercial men have learned with no little satisfaction that Mr. C. R. Zachrisson, who has been appointed consul-general of Panama in this country is to be officially located at Liverpool. Instead of the consul having headquarters in London as is usually the case, Mr. Zachrisson's offices will be at Liverpool. The new consul-general states that London will be one of the subordinate ports as regards trade with Panama, and will be worked from Liverpool, but vice-consuls will probably be appointed at Glasgow, Plymouth and Southampton. Mr. Zachrisson believes that Liverpool will get the lion's share of the trade with the new Republic, when the canal is completed. Liverpool commercial men have high hopes of the trade possibilities of the canal, and the consequent opening up of new business.

The finely modeled steamer Celia has this week undergone her official trial trip. She has been specially constructed by Messrs. Joseph L. Thompson & Sons of the North Sands Ship Building yard, Sunderland, to the order of Messrs. Grace Bros. & Co., Ltd., of London and New York, managers of the New York & Pacific Steamship Co., for trading to the Pacific ports. This is the fourth vessel Messrs. Thompson have constructed for these owners. The principal dimensions of the vessel are: Length over all, 414 ft.; breadth, 50 ft.; and molded depth, 31 ft. 4 in. She is constructed to Lloyds highest class on the strengthened spar-deck rule, under Lloyds special survey. A poop deck about 265 ft. long is fitted, and on top of this deck amidships accommodation is provided for saloon, captain's room and spare berths, and alongside the engine casings the officers and engineers are accommodated, the crew being berthed under the poop deck aft. Provision is made for water ballast through the cellular double bottom and in the after peak, and the holds are divided by six watertight bulkheads. A large chart and steering house is fitted on top of the saloon house. The vessel has a most complete complement of deck machinery, including ten large steam winches, steam windlass and a steam steering gear placed at the after end of the casings, with controlling gear to the bridge, all supplied with steam from a large marine-type donkey boiler placed in the casings. Nineteen derricks in all are fitted, including several lifts for exceptionally heavy weights to facilitate the rapid loading and discharging of cargoes. The vessel is fitted with both cattle and cargo doors, bullion-room, etc., and is a splendid example of the modern first-class cargo steamer. A complete electric light installation has been fitted by the Sunderland Forge & Engineering Co. The engines and boilers have been built by Messrs. John Dickinson & Sons of Sunderland to a special specification, the size of the cylinders being 26, 44 and 72 in. diameters by 51 in. stroke, with three boilers working at 180 lb. pressure. During the trial everything worked most satisfactorily, the average speed on the measured mile being about 12½ knots. The vessel has been constructed under the supervision of Mr. D. Mathieson of Newcastle-on-Tyne, assisted by Mr. Dodds, and will be commanded by Capt. Dexter.

The steamship Germanic, formerly of the White Star fleet, and latterly fixed to take a place under the new name of Labrador, in the resuscitated weekly Canadian service of the Dominion Line, will shortly leave the Mersey for Southampton, there to take the sailings of the steamer New York in the American Line service between Southampton and New York. The Germanic will remain on the Southampton route under her old name until the New York has been thoroughly overhauled and repaired at Belfast, after the damage sustained by grounding off Cherbourg, and afterwards colliding with the troop ship Assaye, leaving Southampton on March 20. It is expected that about three months will elapse before the Germanic returns to her home port. The vacancy thus caused in the Canadian fleet of the Dominion Line will be filled by the Vancouver, latterly employed in the Boston-Mediterranean trade, but formerly the favorite ship of the Dominion Line service to Canada.

Mr. H. Concannon, the assistant general manager of the White Star Line at Liverpool, has just been promoted to the rank of Colonel of the Fourth V. B. Liverpool regiment, and he is being heartily congratulated by his shipping friends for this reward of 17 years' very active service as a volunteer. Mr. Concannon is a very popular personage in Liverpool shipping circles. He has won his way to the front by his own merits, and this promotion has given pleasure to all who have in any capacity come in contact with Mr. Concannon.

On Tuesday the third-class cruiser Topaze, built by Messrs. Cammell, Laird & Co., Birkenhead, was taken for a preliminary trial outside the Mersey. The Topaze's measurements are 360 ft. long by 40 ft. beam, and she has a displacement of 3,000 tons, an indicated horse power of 9,800, an estimated speed of 21¾ knots, and a draught of 14 ft. 6 in. The armaments are twelve 4-in. guns, eight 3-pounders and four machine, and the vessel is fitted with the Laird water-tube boilers. In this connection Mr. J. W. Laird, addressing the shareholders of the company on Thursday, said the works were exceedingly busy with new warships and repairs for the British government. They had also two scouts building to their own design, which had nothing to do with the British admiralty. They had been asked to build in competitive design the fastest ships in the world, and they were endeavoring to do so. The Russians talked of doing 24 knots; Laird's scouts were designed to do 25 knots. They were important ships of 3,000 tons displacement. Both were now on the stocks, and the company were looking forward to highly satisfactory results with them. If these were to be a new type of warship, Laird's would certainly be among those who would be specially selected for further orders. In view of the mysterious ownership of these fast speed scouts, one is led to ask, seeing that British ownership is denied, are they for the Japanese navy. It is not unlikely.

The new steamer which Messrs. Harland & Wolff, Belfast, are building for the Holland-American Line's Rotterdam and New York trade, is to be the largest in the company's fleet. She will be of 17,000 tons, will have a speed of 17 knots and will carry 1,950 passengers.

An interesting ceremony was performed at Dungeness on Thursday evening in the presence of the committee of the elder brethren of Trinity house, when the new lighthouse which has taken two years to construct was duly installed and used for the first time for the guidance of shipping.

It takes the place of the old lighthouse built 114 years ago, is circular in shape, and 140 ft. high from the base to the top of the lantern. The light is one of the most powerful in the English channel, and is visible for 17½ miles. The intensity of the flash, which is repeated every ten seconds, is 144,000 candle power, the illuminant used in the lantern being oil gas burnt on the incandescent principle.

The steamship Colon of the Pacific Mail Steamship Co.'s fleet was wrecked on Ponta Remedios, Salvador, this week. She was bound for Panama with passengers and merchandise. The crew succeeded in beaching the steamer. No lives were lost.

MODEL TANKS FOR RESEARCH WORK.

GLASGOW, April 8.—An important movement is developing from the recent meeting of the Institution of Naval Architects. A committee is to be appointed with the view of bringing before ship owners and ship builders the importance of scientific research carried out with models in experimental tanks, and of adding such accessories to our great maritime industry. This subject was brought forward at the recent meetings of the institution by Sir William White; but it is an old one in Glasgow. Several years ago Prof. Biles, professor of naval architecture and marine engineering at our university, pleaded for such an apparatus, not only for the better education of students in naval architecture but also for the systematic solution of general problems, the results to be at the disposal of all ship builders. The steam shipping possessed by Great Britain, means an aggregate coal consumption of say 70,000 tons per hour, so even a fractional saving from the higher propulsive efficiency consequent on better ship lines, more satisfactory propellers, or some other cause, would be immense in result. Even in high-speed steamers alone, the cost of such a tank would soon be recovered. In the case of the County cruisers, a slight alteration in the surface of the propellers reduced the power for the speed of 23 knots by 15 per cent., and in fifty days' full speed steaming the saving of coal under such conditions would of itself pay the annual cost of £1,500 required to keep a tank working. This economy might be realized by many ships now in service. The first cost of a tank is £15,000. This is not merely a ship builder's question, for the ship owner, on his part, would profit. The North German-Lloyd realize this, and have fitted a tank. Among our ship builders the tank of Denny & Co. of Dumbarton is of long standing, while John Brown & Co. now have their Clydebank establishment similarly equipped.

Sir William White at the institution said that, while model experiments on resistance were of the greatest importance, their full value could never be realized until they were associated and compared closely with the actual performances of ships represented by the models; so that, if a breach of trust took place, which was most improbable, those who were guilty of it could not obtain any great advantage from the information respecting the models taken alone. He was in full agreement with the view that it was not wise to contemplate the establishment of a single tank in any locality to be available for the testing of ship models in connection with designs. The inevitable consequence of a fuller recognition of the value of these tanks, as adjuncts to the designing departments of ship yards, must be the establishment by each of the great firms of its own experimental tank. When it was under consideration to establish at Glasgow an experimental tank in connection with the department of naval architecture in the university Sir William was asked for an opinion, and gave it in the form of a recommendation that, if such a tank were established, its main purpose and application should be in connection with the instruction of students and performance of research work on fluid resistance and ship propulsion, while the testing of models representing actual ships should be the exception, and not the primary employment of the establishment. Sir William expressed his conviction that if the ship builders, marine engineers, and ship owners of this country were well advised, and desired to further to the utmost the maintenance of our supreme position in mercantile ship construction, they would not be slow in responding to the appeal now made, and in providing the funds necessary for the establishment and maintenance, in connection with the national physical laboratory, of a tank avowedly devoted to research work, on the general principles of fluid resistance, the efficiency of propellers, and other matters greatly influencing economy of propulsion. Sir William outlined the general nature of the research work which might be advantageously devolved to the experimental tank which he advocated. First. Exact information, in a shape which would be of service in the selection of the forms of ships most suitable to fulfil varying conditions, greatly needed by naval architects. Secondly. Frictional resistance still requires fuller investigation. Thirdly. The opinion prevails that only experimental investigation can enable the question of the efficiency and design of screw propellers to be dealt with in a satisfactory manner. Recent experience in ships of high speed and new types has given illustrations of a remarkable nature of the economies or waste of power which might be involved in the use of unsuitable propellers. It is well known that in certain cases, by simple increase in blade area, while practically maintaining the same diameter and pitch, great economy in power has been secured at the highest speeds; and that, with the same maximum development of power, an increase in speed of three-quarters of a knot has been obtained. In the Drake class the alteration of propeller blades raised the speed from 23 to 24 knots. Another section of inquiry which presses for thorough investigation, more particularly in view of the introduction of turbo-motors running at high speeds, is the relative efficiency to be obtained with multiple propellers—probably triple or quadruple—in the immediate future. Experience with the earlier vessels fitted on the new system would suggest further improvements in later vessels, just as happened with both single and twin screws in the past. The important subjects of the best shape for the stern, the best arrangements of supports for shafting (either by bossing or by brackets), the most suitable relative position for adjacent propellers (both longitudinally and transversely), and other matters of importance could be investigated at comparatively small cost. Fourthly. The question of air-resistance is becoming increasingly important, especially in passenger steamships with enormous superstructures and with multiplied shelter-decks. Fifthly. The influence of depth of water upon the resistance of ships is also becoming more and more important as speeds are increased. Sixthly. There is a need for more thorough investigation of all questions relating to the maneuvering powers of ships, either under the action of their rudders or of their propellers. Seventhly. Experimental tanks furnish the only satisfactory method of dealing at moderate expense with novel proposals for radical changes in the forms of ships. Eighthly. Special cases arise, especially in connection with warship design, which can only be dealt with by means of model experiments in a satisfactory or conclusive manner, and at present private ship builders or ship owners have practically no means of dealing with such problems. These were some of the principal directions in which, in Sir William White's judgment, the proposed national experimental tank could be employed with great advantage to ship owners and ship builders in the immediate future. The establishment of this tank, and the provision of funds for its maintenance and working, were commended to the notice of the shipping interests with the assured conviction that the expenditure would be amply repaid by beneficial results and by large savings in expenditure of power and coal which would be obtained in all classes of ships, and particularly in ships of novel design or exceptional speed. Prof. Biles said that, when he was appointed to the chair of naval architecture, and considered the question, he came to the conclusion that a co-operative scheme under which ship builders could have their models tested was impracticable, partly because when competitive designs were invited from builders there would be difficulty, owing to the congestion of work, and partly because the issues were so important that accuracy and secrecy by students could not be guaranteed. A research tank for investigating general problems was most desirable, and so far as Glasgow university was concerned little difficulty would be experienced in getting funds to meet the cost of construction. In fact, two or three offers to build such a tank had been made, but the real difficulty would be the institution of a fund for its working expenses.

RAISING THE LEVEL OF LAKE ERIE.

In the Marine Review of March 31, Capt. James Stone, supervising inspector of steam vessels for the Cleveland district, published a communication in which he maintained that to raise the level of Lake Erie 2 ft. it would only be necessary to raise the bottom of the river at the outlet of the lake 2 ft. His express language was: "Returning to the consideration of lake levels, I would suggest that perhaps the general impression prevails that to raise the surface of Lake Erie say 2 ft. that it would be necessary to build a dam to some considerable height, while in fact raising the bottom of this river 2 ft. will undoubtedly result in raising the entire surface of the lake 2 ft. To illustrate, suppose the water enters the river flowing in a volume 8 ft. deep and 1,000 ft. wide, and if by any means you raise the bottom of the stream 2 ft. the entire width, you will succeed in carrying the surface of the entire lake 2 ft. higher. The supply to Lake Erie remaining the same, the outflow necessarily remains fixed and such outflow of 8 ft. in depth can only be maintained by a rise of 2 ft. in Lake Erie. The moment the surface of the lake drops at all, less water must necessarily pass down the river, which cannot be true while the supply is not diminished. Therefore, in order to deepen Lake Erie and its harbor 2 ft. we have only to build a dam on the bottom of the river 2 ft. high from shore to shore just at the point where the surface of Lake Erie perceptibly commences its descent into the Niagara river."

Capt. Stone's contention is not supported by the engineering profession. They unanimously proclaim his reasoning to be fallacious. Following are some of the opinions:

Replying to inquiry in your letter of April 4 asking for my opinion regarding the soundness of the contention that the construction of a submerged dam 2 ft. above the bottom of Lake Erie at the point where it flows into the Niagara river, would result in raising the surface level of the lake by the same amount, i. e., 2 ft., I beg leave to say that in my opinion the argument upon which your correspondent bases his assertion is entirely fallacious. It does not by any means follow that the velocity over the dam would be the same as the velocity at that place before the dam was built, and therefore the sectional area to permit a given amount of outflow would not be constant but would decrease as the velocity increases. The moment that the dam causes the slightest raise above, the velocity will be increased because the declivity at that point is increased. Within the limitations which this case would involve, the increase in velocity due to the an exceedingly small raise in the level above the dam, would be sufficient to compensate for the reduction in sectional area caused by the dam. It is my opinion therefore that a dam such as is described by your correspondent would produce but very slight effect.

Very truly yours,

JARED A. SMITH.

Cleveland, April 11.

Replying to your note of inquiry of the 4th inst., I would say that the construction of a dam 2 ft. high above the bed of Lake Erie and across its outlet at the head of the Niagara river would have little or no effect to raise the level of the water in the lake. The flow of water over submerged dams presents a very complicated problem. It has been solved for particular cases by a number of experimenters, and formulas have been deduced which, if applied within the limits covered by the tests upon which they are founded, give approximately correct results. It used to be an old rule of "thumb" given in the books on engineering, that in the case of a submerged dam the height of which was not greater than one-half the depth of the water on which it was placed it would have no effect in raising the surface and could be passed over by a vessel without any trouble. The more recent and elaborate experiments have proved this to be not strictly true, and it is no longer enunciated as a correct principle of hydraulics.

Very respectfully,

DAN C. KINGMAN,
Major, Corps of Engineers, U. S. A.

Cleveland, April 6.

Your note of April 4 requesting my opinion as to the soundness of the contention of Mr. James Stone in his letter which appeared in your last issue regarding the raising of the level of Lake Erie is received. There is no doubt that if at the outlet of Lake Erie the bottom were raised 2 ft. it would undoubtedly raise the surface level of the lake, but that it would raise it 2 ft. is not probable. In fact, it is certain that it would not as the water would flow more swiftly over this submerged dam than it does over the present dam.

Mr. Stone's general idea, however, of obstructing the outflow of the lake in order to raise the water in the lake is a good one and one to which I have given a good deal of study. Instead of building an expensive dam clear across the river, it has seemed to me that a partial dam could be built in the shoal waters of the American side of the river, which would compensate for the excavations which have been made to give a navigable channel through the natural rock bottom at the outlet of the lake and for the other unnatural draughts like the Welland canal on the lake. This could be done without interfering with navigation down the Niagara river, which Mr. Stone's plan would certainly do. Of course, a submerged dam of 2 ft. could be built as Mr. Stone suggests, without damaging the navigation interests if the canal around the upper rapids of the Niagara river should be built.

The problem of regulating the level of Lake Erie is a far more complicated one than it is evident from Mr. Stone's letter he believes it to be. There is no trouble whatever in raising the low water of Lake Erie to any desired height. The complication comes in in doing this and at the same time in not raising the high water to a dangerous and damaging height, and in conserving the present and improving the future navigation capabilities of of the Niagara river.

Before the complete regularization of Lake Erie is undertaken, it should be carefully studied in all its phases and the effects of all possible consequences from every kind of structures considered. The more it is studied and looked into, the more complicated it seems to be.

Very respectfully,

T. W. SYMONS,
Colonel, U. S. Army.

Washington, April 6.

It is not sound. He ignores increase of width due to raising the level and increased velocity of discharge due to increased head. Moreover, regulating works should raise the level at *low* water but not at *high* water. The proposed simple dam would raise the high water level though less than it would the low water level.

O. W. ERNST,
Colonel, Corps of Engineers.

Chicago, April 6.

Your letter of April 4 relative to a communication in recent issue of the Review on lake levels has been received, and in reply I have to say that your correspondent's statement that the raising the bottom of the river 2 ft. will result in raising the surface of the lake 2 ft. is erroneous. Your correspondent can not be familiar with the law of water flowing over submerged weirs or he would not have made such a statement

Yours truly,

GEO. Y. WISNER.

Los Angeles, Cal., April 11.

Other engineers who do not care to publicly discuss the matter, while denying that a dam 2 ft. high at the outlet could cause the raising of the level 2 ft. maintain that that, however, is merely a detail. A sufficient obstruction would

cause the rise of 2 ft. The real difficulty is not to raise the level of the Lake Erie but to regulate its surface. If the level were raised high water would go to some corresponding height above the present high water level, and of course, the damage to property about the lake would be immense. It is maintained that in order to raise the low water stage without raising the high water stage the provision of a movable dam is essential.

IMPROVEMENT OF THE UPPER NIAGARA RIVER.

By Col. Thomas W. Symons.

A hundred years and more ago one of the principal routes for the transportation of freight between the east and west was up the St. Lawrence or up the Mohawk and down the Oneida and Oswego rivers into Lake Ontario, through Lake Ontario to the Niagara river at Lewiston. Thence a portage was made about Niagara Falls to Schlossers just above the main falls and rapids, where freight again took boat for the journey up the upper Niagara into Lake Erie and on to the west. As traffic increased and sailing vessels gradually replaced batteaux it was found that the bad rapids at the extreme head of the Niagara river were a serious impediment to navigation and that it was extremely desirable to have a harbor above these rapids which could be reached by sailing vessels and where trans-shipment for up-lake ports could be safely and conveniently made.

Near the American shore just where Lake Erie converges into the Niagara and at the very head of the rapids was a little island called Bird Island. Behind this island was a small harbor where the light draught vessels of the day could find shelter from the storms of Lake Erie. Here was established the town of Black Rock destined in the minds of its promoters to be the future great city of the lakes and here much business was done. For the accommodation of the traffic piers were extended up and down from Bird island until finally the down stream pier ran the length of the rapids with a dam at its lower end. In connection with this dam a lock was built 36 ft. wide and 200 ft. long which was called the "ship lock" and which is still in use. This Black Rock harbor and lock permitted good size vessels to pass from Lake Erie into the quiet waters of the Niagara below the rapids and a fine trading, commercial and trans-shipping center was developed at the Tonawandas, and Tonawanda's hopes were high.

But lake vessels were growing in size and other ports like Buffalo were developing and Black Rock harbor and its ship lock were soon found outclassed and inadequate. Tonawanda had to depend on its vessels running the rapids going down and being helped up by powerful tugs. Lake vessels continued to grow and the rapids were shallow and then the government was appealed to and a channel was excavated through the rocks at the head of the rapids which limited the draught of vessels that could be used. But this channel was not made deep enough and it cannot be made deeper without lowering the waters of Lake Erie and injuring many ports and interests. Moreover it is an imperfect remedy as it would always be dangerous for vessels to run the rapids through such a channel going down and inconvenient, expensive, particularly for loaded vessels to ascend the rapids. While stationed in Buffalo and studying the subject of transportation in all its phases I became convinced that in the general interests of commerce the splendid natural harbor of the Niagara river between Lake Erie and the falls should be opened up to the largest ships of the lakes and equally convinced that the proper way to do it was to revert to the original plan and improve and deepen Black Rock harbor and provide a proper lock at its lower end. I made a report to this end and this is the subject that is now up for discussion and for which the government is asked to appropriate the required funds.

Under ordinary circumstances such a project could wait for some years without any injury than that of a local and temporary character. But with this project there are peculiar circumstances of the greatest weight which demand immediate action.

New York has entered upon the work of enlarging the Erie canal to a capacity for 1,000 ton barges at a cost of over $100,000,000. The canal is to run from the Hudson to the Niagara at Tonawanda. From Tonawanda to Lake Erie the Niagara will be used as a portion of the general canal route. The utilization of this portion of the Niagara as a harbor where lake vessels and canal barges can meet and transact their trans-shipping business is a vital and essential feature of the great commercial free water highway between the East and the West which this Erie canal and the great lakes will constitute.

If the ship canal around the upper rapids is not built the state barge canal will lose a large part of its usefulness. If it is to be built it should be undertaken at once, so that it can be completed by the time that the barge canal is completed, and so that plans for the utilization of the through route can be made with the assurance that all the links in the great chain will be ready at the same time.

Its relation to the New York barge canal is the main reason why this governmental canal work should go on at the earliest possible date. It is not however, by any means the sole reason why the work should be done. I pointed out in my preliminary report on this project its relation in other ways to general lake commerce, to the great power development at Niagara falls, and to the necessity of providing room for large manufacturing enterprises where would be available and could meet lake, canal and rail transportation and the power generated at Niagara falls. All combine to make this project a most worthy one to be undertaken by the general government and at once.

IMPROVEMENT OF CANADIAN WATERWAYS.

The department of marine of the Dominion government expects to expend about $1,000,000 this year in the improvement of lignthouses, providing new light and signals, and in other ways securing aids to navigation. This money will not be expended on the St. Lawrence route alone. There are old lighthouses on the great lakes which have been neglected for years. These will be put in repair. New fog horns and signals will be added to those already established on the Atlantic coast.

At the last meeting of the lighthouse board an expenditure of over $200,000 was recommended, and the department has made provision for the amount. Another meeting of the board will be held next week, when further expenditures will be passed upon.

According to the annual report of the department there are 2,027 persons employed in the outside service of the marine department. These include lightkeepers, crews of government steamers, etc. The total number of steamboats in Canada is 1,633. Last year 120 were added. Casualties to British and Canadian seagoing vessels in Canadian waters, and Canadian vessels in other waters, totaled 237, representing 162,297 tons register. The loss of vessels and cargoes aggregated $409,991. Masters were responsible for four casualties in the Gulf and River St. Lawrence, which were investigated, pilots for three, and three were due to the perils of navigation. The department last year spent for construction and maintenance of light stations $958,875, an increase of $262,782.

The bridge over the Ashtabula river at Bridge street in the harbor of Ashtabula has been declared to be an unreasonable obstruction to navigation and has been ordered replaced by a new bridge which will afford a clear navigable opening of not less than 140 ft. This will necessitate the removal of the present center pier. Maj. Dan C. Kingman, government engineer, will hold a hearing in his office on May 18 to listen to arguments concerning the proposed improvement.

SHIP BUILDING IN THE UNITED KINGDOM.

The total addition of steam tonnage to the register of the United Kingdom during 1903 was 1,008.756 tons gross, sailing tonnage 34,595 tons gross, or in all 1,043,351 tons gross. About 93.5 per cent of the tonnage added to the register consists of new vessels, nearly all built in the United Kingdom. The largest items among the other additions to the register are those of vessels transferred from foreign countries and from British colonies to the United Kingdom. These together amount to 55,086 tons, or about 5.3 per cent of the total.

The gross deduction of steam tonnage from the register amounts to 508,648 tons; and, of sailing tonnage, to 117,774 tons; or, in all, to 626,422 tons. About 39 per cent of the steam tonnage, and 54 per cent of the sailing tonnage, included in these figures, have been removed on account of loss, breaking up, dismantling, etc.

The tonnage transferred to foreigners during 1903 amounts to 300,474 tons. The steam tonnage deducted on this account is 250,436 tons, and the sailing tonnage 50,038 tons, or about 49 per cent and 42 per cent respectively of the gross deductions in each case. The total slightly exceeds the similar figures for 1902, but is with that exception the smallest reported for this item since 1894, the annual excess in the years 1895 to 1901 varying from 39,000 tons in 1896 to 309,000 tons in 1899. The returns show that 74,931 tons have been transferred to Italy, and 49,370 tons to Norway, within the year under review. Among other countries which have acquired a considerable amount of tonnage from the United Kingdom may be mentioned Germany (27,553 tons), Japan (23,350 tons), and Belgium (21,450 tons). In the main, the vessels which are transferred to foreigners are not of very recent construction. The returns indicate that nearly 34 per cent of the tonnage removed from the register because of foreign transfer was built before 1880, 59 per cent before 1885, and 71 per cent before 1890. In addition to the tonnage transferred to foreigners 62,907 tons have been transferred to British colonies during 1903, as compared with 32,603 tons in 1902 and 59,296 tons in 1901. It will be understood that new vessels built in the United Kingdom directly for colonial and foreign owners are not included in these returns.

On the whole, during 1903, the steamers on the official register of the United Kingdom have increased by 319 vessels, and 500,108 tons, while sailing vessels have decreased by 113 vessels, and 83,179 tons. The total number of vessels on the register has therefore increased by 206, and the total tonnage by 416,929 tons during the year.

During 1903, 618 new vessels of 1,099,249 tons, have been classed by Lloyd's register. Of these vessels, 573 of 1,053,640 tons are steamers, and forty-five of 45,609 tons are sailing vessels. Practically all the tonnage classed has been built of steel. Sailing tonnage, which formed 25 per cent of the total tonnage classed in 1891, 30 per cent in 1892, only between 1 and 2 per cent in each of the years 1899 to 1901, and 5.7 per cent in 1902, forms 4.1 per cent of the total classed in 1903.

Among the vessels classed during the year—besides passenger and cargo vessels of ordinary types—are nine steamers, one sailing vessel and one barge, to carry oil in bulk; eight steamers (including seven of the nine just mentioned) fitted to burn liquid fuel; two cable steamers, twenty-two yachts, 143 steam fishing vessels (principally trawlers), nineteen tugs, coasting and river vessels, dredgers, barges, etc.

The average size of the steamers classed during the past year is about 1,839 tons, and of sailing vessels about 1,013 tons. Excluding vessels under 200 tons, in order to avoid the diminution caused by yachts, trawlers, etc., the comparative averages for the past few years stand as follows:

	1903	1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Steam	2,452	2,733	2,906	2,706	2 807	2 634	2,452	2,555	2 647	2.219	2,356
Sail...	1,518	2,018	2,551	1,580	1.612	1,441	1,741	1,826	1,607	1,816	1,684

The Welland canal will open for the season on April 25.

SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction exhibits a steady progress in naval vessels under way in the various ship yards of the country. It is to be noted that the Louisiana is 10 per cent in advance of the Connecticut and is probably likely to increase this lead in the future. Following is the summary:

Name.	Building at	Degree of completion. Per Cent. Mar. 1.	Apr. 1.
	Battleships.		
Ohio	Union Iron Works.	88	91
Virginia	Newport News Co.	55	56.8
Nebraska	Moran Brothers Co.	41.6	44.5
Georgia	Bath Iron Works.	47.6	49.91
New Jersey	Fore River S. & E. Co.	52.1	55.3
Rhode Island	Fore River S. & E. Co.	54	57
Connecticut	Navy Yard, New York, N. Y.	30.86	34.56
Louisiana	Newport News Co.	40.56	44.27
Vermont	Fore River S. & E. Co.	4.6	5.6
Kansas	New York Shipbuilding Co.	5.2	6.3
Minnesota	Newport News Co.	18.29	21.65
Mississippi	Wm. Cramp & Sons.	0	0.7
Idaho	Wm. Cramp & Sons.	0	0.6
	Armored Cruisers.		
Pennsylvania	Wm. Cramp & Sons.	68.6	71.2
West Virginia	Newport News Co.	76.76	80.25
California	Union Iron Works.	56.5	58
Colorado	Wm. Cramp & Sons.	73	77.5
Maryland	Newport News Co.	71.22	75.88
South Dakota	Union Iron Works.	52.5	54
Tennessee	Wm. Cramp & Sons.	19.5	23.4
Washington	New York Shipbuilding Co.	17	20.9
	Protected Cruisers.		
Denver	Neafie & Levy Co.	98	99
Des Moines	Fore River S. & E. Co.	99.5	100
Chattanooga	Lewis Nixon.	72.6	75
Galveston	William R. Trigg Co.	73.5	75
St. Louis	Neafie & Levy Co.	38	40.9
Milwaukee	Union Iron Works.	44.5	46
Charleston	Newport News Co.	64.5	67.2
	Gunboats.		
Dubuque	Gas Engine & Power Co.	29.1	33.5
Paducah	Gas Engine & Power Co.	25.5	29.1
	Training Ships.		
Cumberland	Navy Yard, Boston.	26	28.5
Intrepid	Navy Yard, Mare Island.	9	12
	Training Brig.		
Boxer	Navy Yard, Portsmouth.	20	28
	Torpedo Boats.		
Stringham	Harlan & Hollingsworth.	93	93
Goldsborough	Wolff & Zwicker.	99	99
Blakely	George Lawley & Son.	99	99
Nicholson	Lewis Nixon.	99	99
O'Brien	Lewis Nixon.	98	98

The house committee on merchant marine and fisheries has reported favorably upon the Frye bill for the regulation of steam vessels. While some members of the committee dissented from some phases of the bill, especially the centralization of power in the secretary of commerce and labor, they felt the need for improvement in the steamship inspection service was so great and the time remaining for adjourning so small, that they yielded their differences of opinion on the understanding that if the act is not satisfactory amendments shall be made at the next session. The feature of the bill upon which there was entire agreement was that giving fixed salaries to the inspectors of hulls and boilers, instead of basing their compensation upon the number of vessels which they inspect.

DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

Published every Thursday by

The Penton Publishing Company,

CLEVELAND, OHIO.

CLEVELAND: WADE BUILDING.
CHICAGO: MONADNOCK BUILDING.
DETROIT: HAMMOND BUILDING.
NEW YORK: 150 NASSAU STREET.

Correspondence on Marine Engineering, Ship Building and Shipping Subjects Solicited.

Subscription, $3.00 per annum. To Foreign Countries, $4.50. Subscribers can have addresses changed at will.

The Cleveland News Co. will supply the trade with the MARINE REVIEW through the regular channels of the American News Co.

Entered at the Post Office at Cleveland, Ohio, as Second Class Matter.

APRIL 21, 1904.

Congress is on the heels of its existence and it is probably too much to hope that the McComas bill to extend the coasting laws to include the Panama canal zone may be passed at the present session, but if it is possible to put it on the calendar and pass it, it should be done. This bill is designed to keep the ocean carrying trade incidental to the construction of the canal within the control of American ship owners. The building of the canal is the splendid contribution of the United States to the material welfare of the nations. It will render unnecessary forever hereafter the long, tedious and perilous trip around the Horn. No one hopes that the canal will become for many, many years a commercially paying proposition. It is not being built for the purpose of making money, but every penny of its cost will be borne by the American people. Should not, therefore, the legitimate profit which is to be extracted by individuals from the labor of building the canal go into American pockets? For ten years a constant stream of material, supplies and provisions will be going forward from American ports to the canal zone. Is it not a matter of strict justice to the American people that this commerce should be forwarded in American ships? The canal zone is the property of the United States. An American governor will govern it and American laws will preserve life and property there. It is a perfectly legitimate thing, therefore, to extend another arm of the American law, the coasting law, to this zone. The exact provision of the McComas bill is as follows:

"That from and after the time of the possession and occupation on behalf of the United States of the canal zone of Panama, and until the construction and completion of a canal connecting the waters of the Atlantic and Pacific oceans, the act to regulate shipping in trade between ports of the United States and ports or places in the Philippine archipelago, between ports and places in the Philippine archipelago and for other purposes approved April, 1904, so far as applicable, shall apply and be in force between ports of the United States and ports or places in the canal zone of Panama and between ports or places in the canal zone at Panama as fully and in the same manner as if the canal zone at Panama were included in the terms and provisions of said act: Provided, That the sections and provisions of said act limiting the time for the same to take effect on the first day of July, 1906, shall be applicable to the ports and places in the canal zone on the first day of July, 1905."

The Philippine bill restricting the carrying trade between the United States and the Philippine islands to American bottoms will go into effect two years from next July. The interim will undoubtedly be devoted to building ships for this trade, for it is not alone the freight of the Philippines that is to be obtained, but also the trade of China and Japan and other oriental countries. With an assured and certain market in the Philippines it will be much easier to cultivate the uncertain market in the orient. Ship building throughout the entire country will undoubtedly be stimulated by this extension of the coasting laws, and it would not be surprising also if ship building on the great lakes would be indirectly aided by it. A 3,000-ton ship can be built as cheaply on the great lakes as anywhere in the United States. The one really grand thing about the Philippine bill is that it affords tangible assistance to American ship builders and ship owners. For the benefit of those who may not have seen the bill it is given as follows:

That on and after July 1, 1906, no merchandise except supplies for the army and navy shall be transported by sea, under penalty of forfeiture thereof, between ports of the United States and ports or places in the Philippine archipelago, directly or via a foreign port, or for any part of the voyage, in any other vessel than a vessel of the United States. But this section shall not be construed to prohibit the sailing of any foreign vessel between any port of the United States and any port or place in the Philippine archipelago; provided, that no merchandise other than that imported in such vessel from some foreign port which has been specified on the manifest as for another port, and which shall not have been unloaded, shall be carried between a port of the United States and a port or place in the Philippine archipelago.

SEC. 2. That on and after July 1, 1906, no foreign

vessel shall transport passengers between ports of the United States and ports or places in the Philippine archipelago, either directly or by way of a foreign port, under a penalty of $200 for each passenger so transported and landed.

SEC. 3. That sections one and two of this act shall not apply to the transportation of merchandise or passengers between ports or places in the Philippine archipelago. Until congress shall have authorized the registry as vessels of the United States of vessels owned in the Philippine archipelago the government of the Philippine islands is hereby authorized to adopt, from time to time, and enforce regulations governing the transportation of merchandise and passengers between ports or places in the Philippine archipelago.

SEC. 4. That sections one and two of this act shall not apply to the voyage of a vessel between a port of the United States and a port or place in the Philippine archipelago begun before July 1, 1905.

SEC. 5. That sections one and two of this act shall not apply to vessels owned by the United States.

SEC. 6. That on and after the passage of this act the same tonnage taxes shall be levied, collected, and paid upon all foreign vessels coming into the United States from the Philippine archipelago which are required by law to be levied, collected, and paid upon vessels coming into the United States from foreign countries: Provided, however, That until July 1, 1905, the provisions of law restricting to vessels of the United States the transportation of passengers and merchandise directly or indirectly from one port of the United States to another port of the United States shall not be applicable to foreign vessels engaging in trade between the Philippine archipelago and the United States; And provided further, That the Philippine commission shall be authorized and empowered to issue licenses to engage in lighterage or other exclusively harbor business to vessels or other craft actually engaged in such business at the date of the passage of this act, and to vessels or other craft built in the Philippine islands or in the United States and owned by citizens of the United States or by inhabitants of the Philippine islands.

SEC. 7. That this act shall not be construed to impair or affect any privilege guaranteed to Spanish ships and merchandise by the treaty between the United States and Spain signed at the city of Paris on Dec. 10, 1898, and ratified April 11, 1899.

SEC. 8. That the secretary of commerce and labor shall, from time to time, issue regulations for the enforcement of this act, except as otherwise provided in section three: Provided, That such of the navigation laws of the United States as are in force in the Philippine archipelago in regard to vessels arriving in the Philippine islands from the mainland territory and other insular possessions of the United States shall continue to be administered by the proper officials of the government of the Philippine islands.

Of the three measures affecting the merchant marine before Congress at this session the success of two is already assured, while the success of the third depends upon the attitude of certain senators who can talk it to death if they desire. This is the bill introduced by Mr. Gardner of Massachusetts for the appointment of a commission to investigate the merchant marine during the recess of Congress, and to be ready to recommend remedial legislation at the December session. It has not yet passed the senate. It is expected that it will be passed by the house this week. The bill extending the coastwise laws to the Philippines has, of course, passed and the senate bill requiring military and naval supplies to be transported in American bottoms is now awaiting the action of the house.

THE MAN AT THE WHEEL.

Congressman Lucking of Detroit, Mich., is a daisy all right enough.

Reared in and representing a constituency that owes so much to and is so proud of its location on the beautiful Detroit river, one of the world's great waterways, and as fully cognizant, probably, as any man of the advantages that have accrued to his home city because of its location and the value of the commerce that passes its doors, he yet never has lost an opportunity during his exceptionally brief career in Washington to attack with a peculiarly venomous energy any measure, no matter what, that might have for its object the direct or indirect advancement of the American merchant marine.

In no part of the world has the freight carrier been as fully developed and all the laws that bear upon the rapid and economical transportation of freight been so thoroughly mastered as in the lake region with which he is so familiar; and in no part of the world is a ton of freight carried as cheaply, in no part of the world are the salaries and wages paid officers and men as great; and in no part of the world are the earnings of the ship owner as satisfactory as in this same territory.

And further, there is no part of the habitable globe in which the ship owner is so amply protected in every way as in that section.

First, there are the natural obstructions of the rapids and narrow channel of the St. Lawrence river and the falls of Niagara, up which none of the foreign merchant vessels so dear to the heart of the Detroit congressman have been thus far able to navigate; and secondly, there are certain coast laws which simply provide that all freight and passengers carried between one American port and another shall be conveyed in American ships.

If the patriotic gentleman who grows hysterical whenever there is any talk of extending these coast laws to the Philippine Islands, for instance, could only succeed in having them stricken out altogether, it is more than likely that in the near future some of this trade which is now "monopolized" by Americans would perhaps be carried in British, German, Norwegian or Italian vessels if any were constructed within the canal requirements, and the cup of happiness of these champions of the foreign ships would doubtless be somewhat more full than at present.

Mr. Lucking is reported at great length to have claimed that the extension of the coast laws to include the Philippine Islands would mean that a few great steamboat companies would "monopolize" this trade and charge all sorts of outrageous freight rates and that this proposed legislation was inspired and urged by all sorts of questionable methods for all sorts of questionable purposes.

Any old argument to beat the American ship.

In this he was as nearly accurate as a man generally is who finds himself upon the wrong side of the question and is looking for a way of escape—he usually resorts to vituperation and abuse together with a doubt of the integrity of the other fellow's motives.

There can be, as has been pointed out before, no great danger from a "trust" or "monopoly" that controls neither the sources of supply nor the right of way.

In this case the ocean highways are as free as the sky above to Mr. Lucking or any one else who may desire to use them, and we ought to be thankful that it is unnecessary to approach the wise men at Washington to secure a franchise to operate a ship on salt water, for if such a course were compulsory they would probably consider it a misdemeanor for any American to attempt such an undertaking.

A child would almost know better than to advance some of the stock arguments put forth at times by the grand stand player when trying to achieve a little cheap notoriety for himself.

It is claimed also that this would mean a radical increase in the freight rate between the United States and our new possessions in the Pacific, and the tender-hearted protector and self-appointed guardian of the poor Filipinos overlooks the fact as shown in the congressional reports, viz., that the extension of the coast laws to Porto Rico and Hawaii, only very recently, have greatly decreased the cost of transportation for the simple reason that the service became regular and constant and the American ship could better afford to take a "sure thing" cargo of molasses for $1.60 a hogshead from Porto Rico to Boston rather than agree upon some uncertainty at $2.25 a hogshead with a likelihood of having no return cargo.

It is somewhat significant also that the fact that this trade in American ships would undoubtedly bind the Philippine archipelago more closely to our country and our government met with the character of the opposition that has been showered upon it.

And again, the well established fact that "Trade follows the Flag," and that all the evidence submitted went to show that American capital would probably become quickly invested, American goods and manufactured articles find a more ready market, and our ships would be assisted in reaching out and securing their share of the business with Japan, China and the Orient, appeared to inspire some of the opponents to this measure to a sort of frenzy.

That there were plenty of American ships available for this service, and that no confusion or inconvenience would result was amply shown by the report of the war department, and yet the opposition, led in a small way by Congressman Lucking, seem to have a fearful dread of any legislation that would give these American ship owners a chance to earn their fixed charges.

But Congressman Lucking and his friends in congress had also some few friends and supporters outside of Washington, as might naturally be expected.

A detailed report of the character of their support is given in the New York Daily Commercial of this week in its issue of April 18.

The New York Maritime Exchange Association, organized thirty years ago with a New York charter, is an organizaiton of 1,071 members, two-thirds of whom represent foreign interests, owing to the fact that our maritime shipping is almost entirely done by foreigners.

They have hitherto, however, permitted Americans to serve as the principal officers of the organization, but owing to the fact that the officers of the exchange have recently been somewhat active in advocating the right of the American ship owner to some consideration in his own country, the foreign element of the exchange have decided to, if possible, elect their own officers, and have chosen Mr. George L. Woolley, a subject of King Edward VII. who took out his first naturalization papers only last January, a representative of a large and influential English corporation, and this gentleman, in a published interview, gives the following as one of the reasons why the foreign element of the Maritime Exchange have determined to endeavor to secure control:

"We are opposed to the present president being re-elected, because he favors the control by American tonnage of the transport trade. In other words, the carrying of government supplies in American ships. He favors measures in congress 'you know,' arranging things so merchandise can be shipped to the Philippines only in American bottoms. Now, 90 per cent of the business is controlled by English tonnage and of course we don't want to have that changed."

This would seem to set at rest, "of course," for all time any question as to the lack of support that Mr. Lucking and his friends in congress might possess, and while it is just possible, "of course," that these gentlemen, like Cæsar, are all very "honorable" men, there is a striking similarity in the apparent motives and arguments which inspire them all.

It has been intimated that in case the Philippine bill should become a law and the Kittridge bill having reference to the government of our newly acquired territory in Panama should be so amended as to include that territory in our coasting laws, then there might be quite a demand for freight carriers, and that it is more than likely that some of the smaller boats in use on the lakes might with a few minor alterations be used very satisfactorily in the coast trade between New England, New York and our Southern ports with Panama and South American countries, thus giving us what we have not now, a direct freight and passenger service with the South American continent.

This would in addition to giving an impetus to ship building on both coasts, it is thought might interest the lake ship yards by giving them a certain amount of business in constructing new ships to take the place of those withdrawn from this trade.

It can easily be seen, therefore, that about the time congress is in session next winter putting the necessary legislation into effect, and the ship yards which dot the Detroit river and contingent territory are busily figuring for some of this work in order to make both ends meet and give work to their thousands of employes, a certain representative of that territory in congress will be throwing a few fits from his inconspicuous position on the tail end of the committee of marine and fisheries in a wild-eyed effort to prevent any law passing which will permit them to get any of this business.

There are some reasons why, however, our Detroit friends should not be disconsolate.

First: There are other congressmen in Washington.

Second: There is another election day not very far off.

CONDITIONS AT HEAD OF THE LAKES.

Concerning weather conditions at the head of the lakes Mr. George A. Tomlinson of Duluth writes to Hutchinson & Co. as follows: "The great field of ice outside of the harbor has received little or no punishment during the last week, as the weather has ruled cold. Several examinations, a mile from the shore, show the ice to be 28 in. thick. The field is covered with 6 in. of slush ice. It will require at least three weeks of warm weather to dispose of the ice field. There is no activity in grain freights, as vessel owners seem indisposed to enter into any contracts until all labor problems, incident to the operation of the lake marine, are solved. Stocks of grain are slightly in excess of a year ago, but half the supplies is flax, and this will not go forward. Coal continues moving steadily and the surplus will not be large."

THE BLACK ROCK SHIP CHANNEL.

By George A. Ricker, M. Am. Soc. C. E.

Buffalo harbor is divided into two distinct sections by the rapids of the Niagara river. The upper section fronts upon Lake Erie and is protected by the recently completed breakwater. The lower section is upon Niagara river below the rapids which are formed by the outflow of Lake Erie through the narrow portion of the river which divides the northerly portion of the city of Buffalo from the sleepy village of Victoria on the Canadian shore. The harbor, of what may be called the port of Buffalo-Niagara, includes the improved frontage at the foot of the lake and all of Niagara river to a point about 2 miles above the great cataract, at the city of Niagara Falls. Behind the breakwater the entire frontage is now occupied by the great Lackawanna steel plant, the Buffalo & Susquehanna Iron Co., the new terminals of the Pennsylvania, Buffalo & Susquehanna, Lehigh Valley and other railroads. These corporations needed but the assurance that the breakwater would be built to undertake the expenditure of $100,000,000 and at the present time nearly two-thirds of this amount has been invested in the plants and terminals now nearing completion.

The new breakwater does not afford suitable location or opportunity for trans-shipment of the products of the great northwest to the 1,000-ton barges that will carry them to the sea. The Niagara river from Black Rock to Tonawanda is the natural harbor for trans-shipment and it is to reach this lower harbor that the Black Rock ship channel is designed. The ship channel will provide an entrance that will serve not only for the ports of the lower river but will be the real western terminus of the 1,000-ton barge canal.

There is now being excavated under the direction of United States Engineer Bingham, a basin 500 ft. wide and 23 ft. deep back of the north breakwater and Bird Island pier, which affords adequate gateway to the Black Rock channel, that will be completed in 1906. From this basin the ship channel will extend northerly through Black Rock harbor. "For one mile from the upper end, it will be excavated in the present clear water way to Black Rock harbor, then the canal wall separating Black Rock harbor and the Erie canal will be reached, and, in order to secure the required width, this wall must be removed." Its removal will in no way affect or injure the Erie canal as the water level of Black Rock harbor and the Erie canal, is at all times the same. Upon the inner side the new channel will be bounded by the tow path and wall of the Erie canal as it now exists. Upon the outer or river side, it will be bounded by the Bird Island pier for a distance of over 2 miles and for the remainder of its length to the ship lock, by Squaw island. Provision was made at the time of the recent reconstruction of the International bridge, in the order issued by the secretary of war, March 29, 1899 for the substitution of a new bridge, "whenever the secretary of war should deem it necessary or advisable that the portion of the bridge over Black Rock harbor shall be removed or changed in any manner." A new lift bridge is also planned for Ferry street that will afford a clear channel of 150 ft.

At the outlet of Black Rock harbor, where the change of level is to be made to the river, the existing ship lock, is to be removed and a new lock of dimensions that will accommodate the largest lake vessels, is to be built. The difference in level between the water in Black Rock harbor and Niagara river at the lock is generally five feet. Since the lift is so comparatively small, passage through the lock, even by large vessels, will not occupy much time, and the interruption of traffic will be slight as compared with the delays attending the ascent of the river against the swift current of the shallow and contracted section from the Bird Island reef to the lower end of Squaw island.

Lying across the river at Strawberry island is a ledge of limestone, through which a channel that is now 400 ft. and 18 ft. deep will be increased to 23 ft. in depth. From Squaw island to Niagara falls no other considerable rock excavation will be necessary to secure a channel 23 ft. deep.

By the Black Rock harbor improvement and the further excavation specified it will be seen that the entire lower river will be open for deep draft navigation, making available more than 12 miles of water frontage now unused on the main land and a still greater mileage on Grand island.

The relation which the improvement of Niagara river will bear to the barge canal is interesting and all important since it is proposed to terminate the enlarged section at Tonawanda and to use the river from Tonawanda to Black Rock for the passage of the 1,000-ton barges. The combined use of the Black Rock channel for deep draught vessels and for 1,000-ton barges will facilitate trans-shipment of goods; indeed such trans-shipment may be effected at Buffalo, Tonawanda or any intermediate point.

The canal commission has under consideration the practicability of lowering the level of the canal from Tonawanda to Lockport to the level of Niagara river at Tonawanda. This change will provide for feeding the canal directly from Niagara river and will make it possible to do away with the old Erie canal from Tonawanda to Buffalo, which it was expected to maintain as a feeder. If this most desirable change is made, the entire river frontage will be relieved of the present obstacle to its development as the canal skirts the bank of the river and has prevented the use of this frontage for industrial purposes.

Since the new ship channel and lock will occupy Black Rock harbor and the Erie canal and the land about the lock which now belongs to the state of New York, it will be necessary for the United States to acquire the state's right and title to these lands and waterways. Bills have been introduced in the state legislature providing for the transfer of these properties and there is no doubt that the state will, according to precedents, cede its lands for the purpose intended.

It is estimated that the cost of the entire work to produce the deep-draught channel for this greater harbor will be about $4,500,000 and the benefits that would result are summed up in the engineers' report as follows:

"For the commerce of Tonawanda and vicinity there would be provided a channel suited for the deepest lake vessels, in lieu of one with an available depth of but 14 ft. The annual tonnage of vessels in and out of Tonawanda is reported at about 1,000,000. Great manufacturing developments are in progress between Buffalo and Niagara Falls. Commerce between Niagara river and lake ports may be expected largely to increase. The projected 1,000-ton New York state barge canal is designed to terminate at Tonawanda. The Black Rock harbor improvement would be available for deep-draught vessels as well as for barges and trans-shipment might be effected at Buffalo, Tonawanda or at any intermediate point. If the proposed channel and lock were provided, works to regulate the lake level might be constructed at the entrance to the Niagara river without shutting off the latter from lake navigation."

From the earlier report made by Maj. Symons, Oct. 1, 1902, these luminous paragraphs by way of justification of the improvements are quoted.

"This is believed to be a justifiable improvement for several reasons: Because of its central geographical situation, its water transportation by the great lakes, the Erie canal, and the Welland canal, its many trunk lines of railroad, its vicinity to the coal fields of Pennsylvania, and especially to the great water power of Niagara falls, this general locality between Lake Erie and Niagara river is rapidly becoming a very extensive and important manufacturing center, and its future in this regard is almost boundless if proper advantage is taken of natural conditions and necessary and reasonable improvements in these natural conditions are made. The highest industrial development of the country demands that all along the Niagara frontier there shall be assembled con-

veniently and without hindrance transportation by lake, river, canal and rail and the power generated at Niagara falls. The benefits to result from the proposed improvement are so great, so needed, so undoubted, and so immediate, and of such general usefulness, that I have no hesitation in recommending that they be undertaken by the government."

It would be difficult indeed to set out in more effective or convincing manner the benefits to be derived from, and the justification for, the expenditure of this sum of money by the United States and this is the testimony of a distinguished witness, an official of the United States, charged with the duty of investigating and reporting upon the needs of the Niagara frontier and the benefits which might naturally be expected to accrue, not only to the locality but to the whole country, when the improvement described is made.

The state of New York has definitely begun the work of increasing the section of the old Erie canal to such size that it will float 1,000-ton barges. The locks are to be rebuilt and important changes made in its alignment and for this work New York state has pledged itself in the sum of one hundred and one millions of dollars. Adequate terminals for this great canal are as necessary as great yards at the terminals of great railroads. Ample harbors for trans-shipment of goods, with adequate facilities, in order that quick despatch may be had, are absolutely essential. The broad deep channel of the Hudson river and the ample harbor of New York must be matched by an improved Niagara river, in order that delays at Buffalo may be once for all stricken from the records.

The port of Marseilles has expended in the improvement of its harbor nearly $24,000,000, Antwerp $25,000,000, New Castle $27,000,000, Havre $30,000,000, Hamburg $40,000,000, Glasgow $75,000,000 and Liverpool $200,000,000. By comparison with these great sums, the money invested in the improvement of the port of Buffalo-Niagara seems but a trifle.

The advocates of the 1,000-ton barge canal were met constantly with the statement that this great canal would be built, not in the interest of the state of New York, but for the United States and that the general government and not the state should assume the burden. By a great majority, the people of New York state overruled the objection, while admitting that the canal would be in a large measure, a national waterway. The Empire state leads in the march of progress. Its citizens have made their generous contribution to the 1,000-ton barge canal, surely the United States will co-operate with New York state to complete this great water route from the heart of the continent to the seaboard.

NEEDS OF BUFFALO HARBOR.

By J. J. H. Brown.

The owners of American vessels engaged in lake transportation must have noticed with more or less concern the inroads our enterprising neighbors across the border are making upon the lake carrying trade, and that the trade between Canadian ports is limited to Canadian vessels as the trade between American ports is limited to American vessels. But there is nothing to prevent the vessels of either flag engaging in international trade and it behooves us to plan ahead and to retain and also to enlarge our trade and to execute our plans promptly. Nothing of late years has been suggested that would do more to promote the interest of lake vessel owners than the proposed Black Rock ship canal and lock, which would give access to the deep and comparatively still water of the Niagara river below the rapids at its head. As to the necessity for making the Niagara river the main easterly terminus of lake navigation, and in a sense an annex of Buffalo harbor, it is to be noted that the capacity of the present harbor of Buffalo is overtaxed every fall. Some relief will be afforded when the railroad companies that own nearly or quite all the land fronting on the new outer harbor have built their docks, warehouses, elevators, etc.; but even then our harbor capacity will be inadequate to meet the needs of lake commerce terminating in this vicinity to say nothing of the ordinary growth and development of that commerce. When the Erie canal improvements contemplated are completed, which will probably be in five or six years, by reason of the cheapening of freights between Lake Erie and the Atlantic which will follow, there will doubtless be an immense increase in lake commerce, if terminal facilities can be provided. Without great increased terminal facilities there will be such a congestion of commerce where lake and canal navigation meet that our lake vessels, not to speak of the interests of the northwest concerned and the interests of the state and port of New York, will not be able to realize more than a moiety of all the advantages that will surely follow with an adequate terminal harbor.

CAREER OF THE OLD INDEPENDENCE.

Supt. G. A. Marr, in charge of the Portage Lake canal, has received from Supt. Wheeler of Sault Ste. Marie a cribbage board made of oak taken from the hull of the steamer Independence, one of the very first steamers to navigate Lake Superior. The oak has been under water in the St. Mary's river for almost fifty years and is hard and dense as iron, taking a wonderful polish. The Independence was built in Chicago in the year 1846, as nearly as can now be told, and in 1848 was hauled over the Portage at the Sault in the winter and the next season began the navigation of the greatest of the great lakes. Her exact dimensions are not known, but she was a leviathan in those days, and it is figured that she must have been about 200 ft. long. Her career was a checkered one and ended in disaster. In 1852, while Capt. John Averill, until lately a resident of Chicago, was sailing her, she went on the beach at Eagle Harbor and spent the winter there. In the spring she was released by Capt. Calloran and that fall again met with misfortune on Chequamegon point, where Ashland now is. She went ashore on the point in a blinding snowstorm, and again spent the winter on land. She was purchased where she lay by Capt. McKay, father of Capt. George McKay of Cleveland, and early in the spring of 1854 the captain set about releasing her. He built a crib out in the lake for his windlass, and Indians from LaPointe filled this with bowlders brought from shore in their canoes. With the windlass on the crib and house moving jacks pushing against the hull on the shore, Capt. McKay, assisted by one or two heavy seas, finally managed to get the steamer into the lake again, after spending the entire summer at the work. When free she was towed to LaPointe by his crew of Indians in their small boats, and one of the recollections of Capt. George McKay, the veteran of the Lake Carriers' association, is this scene which he witnessed as a boy. After getting the sand out of her hull and machinery at LaPointe, Capt. McKay set sail for the Sault, arriving there in November. Completing his refitting, he took on a large cargo of supplies for the copper country and set sail Nov. 22, 1854, on what was to prove the last voyage of the ill-starred craft. When a few miles from the Sault the boiler of the Independence exploded, killing seven persons and blowing out the stern of the vessel, which sank on the Laverne shoals, where it lay undisturbed until 1896, when Supt. Wheeler had the pieces of oak removed from which this cribbage board and other mementoes of those early days of lake navigation were made.

As a result of a failure to make a contract between the Lumber Carriers' association and the Longshoremen's union, a fight took place on the steamer N. J. Nessen at Manistee this week. The union men demanded 52½ cents per hour and the captain's offer of 50 cents was refused. Thereupon loading was commenced with the crew and non-union men. It is related that the union men swarmed upon the deck and seriously assaulted and injured three of those at work.

CONTRACT FOR NEW CAR FERRY.

The Great Lakes Engineering Works of Detroit has received an order from the Michigan Central railroad for a new car ferry larger than any now in service at this point. It will carry twenty-one freight cars of the largest type, on three tracks. In order to carry this load and at the same time utilize the present ships, the combined screw and paddle type of boat had to be abandoned, and a car ferry designed to cover the above requirements. The increased displacement required to carry the larger cars, however, calls for a greater breadth of hull and with the overall width restricted as it is by the size of the slips, it follows that the side wheels have to be discarded. The design proposed by the Great Lakes Engineering Works contemplates the use of four screws, two forward and two aft, each operated by an independent engine of about 900 I. H. P. Steam will be furnished by two double-ended and two single-ended cylindrical boilers equipped with mechanical draft. The latter, however, will probably only be used for winter work as the boilers will furnish an abundance of steam for ordinary open water working with natural draft. The boat will be equipped with steam steering gear, electric light, and a complete modern equipment. The engines, shafts and propellers will be extraordinarily heavy and all the principal castings will be of the builders' improved "Semi-steel" which has a strength double that of cast iron. Every precaution that experience can suggest will be taken to guard against breakdowns in battling with the heaviest ice. The new steamer will be ready to go into commission in October.

WANT TOLLS AND TONNAGE DUES REMOVED.

The Dominion Marine association has petitioned the governor general in council for the complete removal of tonnage dues and inspection fees in Canada upon both Canadian and United States vessels, including tolls put upon vessels using the Canadian canals and charges upon the vessels themselves which land at government wharves. The canal tolls which were removed for a period of two years, gave an impetus to the shipping in Canada. Now permanent removal is necessary and the Dominion Marine association gives the following reasons therefore:

"1. Because, since last year, $101,000,000 necessary for the construction of a new Erie canal (permanently free from tolls) from Buffalo to New York has been voted, and will place the inland route via New York in a position of superiority, as compared with the present Canadian inland route; and also because the present uncertainty in regard to Canadian canal tolls acts as a restraint on owners in providing the necessary facilities for the future.

"2. Because Canadian steamers are still subject to payment in the United States in consequence of the imposition of fees in this country upon United States steamers, and because the arguments and expressions of public opinion which were found sufficient last year to warrant removing these fees and placing them under the control of the governor general in council, are equally sufficient to support a request to have the fees removed altogether, a complete and final abrogation of these fees in Canada upon both United States and Canadian steamers should now be granted.

"3. In many cases landing is only effected at an actual loss to the vessel and these charges, when accumulated, constitute a substantial burden upon the vessels obliged to make the landing; and while it may be proper to have a charge made upon the amount of freight landed or shipped, yet there should be no charge against the vessel."

Capt. Harry W. Baker has resumed the work of removing the wreck of the John W. Glidden from the ship canal at St. Clair flats. He will start at once to remove the obstruction and expects to have it completely out of the way within a few days.

CHICAGO GRAIN REPORT.

CHICAGO, April 20.—Grain rates have been held fairly steady at 2 cents Buffalo corn and nominally at 2 cents corn for Georgian Bay points, and 4 cents to Kingston, etc. Coupled with the recent engagement of Buffalo corn—not generally believed to have been in excess of some 500,000 bus.—the amount afloat is comparatively insignificant, yet there is no pressure of vessels in the general market if even any near prospect of same. Slow fitting-out preparations but reflect the requirement of something more definite in the down cargo situations as an inducement to starting vessels, but more important perhaps the adjustment of physical conditions looking to assure the uninterrupted occupation once the same are entered for season trade. Shippers announce that our grain prices are considerably too high for business based on the present eastern cash inquiry and while this is probably correct, some advantage may be gathered logically in that our prices must necessarily attract the excess of country grain reserves, thus broadening our local stocks and ultimately working to favor the lake movement.

The comparative stocks of grain in Chicago and South Chicago elevators noted as follows:

	This week.	Last week.	Same week last year.
Wheat	4,647,000	4,745,000	9,085,000
Corn	8,944,000	8,581,000	5,311,000
Oats	4,957,000	5,181,000	2,348,000
Rye	391,000	328,000	700,000
	18,939,000	18,835,000	17,444,000

PRICE OF BESSEMER ORE FIXED AT $3.50

After two days of almost constant conference the Bessemer Ore Association has agreed upon $3.50 for Bessemer lake ore this season. The action of the association in fixing the price of Bessemer at not more than $3.50 per ton is a decided defeat for the United States Steel Corporation which stood out for weeks for $4, or a reduction of 50 cents from last year's schedule. With prices fixed sales may now be looked for. Ore is moving freely forward from Lake Erie docks though the amount that will be on dock May 1 will exceed that of former years. The lake season will be very backward this year both on account of trade and weather conditions.

ICE STILL THICK AT THE SAULT.

Harvey's Marine Bureau sends out the following extremely interesting ice report from Sault Ste. Marie: "We will certainly have an unusual late opening of navigation this year. The ice has not yet left the river between here and the Sault, Ont., although the ferry has a channel cut and is now operating. There is still 40 in. of solid blue ice in Mud lake and there is practically no change in Hay lake. The weather for the past ten days has been very cold and continues so. Teams are still crossing from Detour to Drummond island, which is very seldom the case at this season of the year. In fact this is the first time in twenty years that they have been able to do so as late as this. Reports from Whitefish say there is no open water to be seen and the same conditions exist at Iroquois. There is very little likelihood of the first boat reaching here before May 10 and it may be later."

The International Longshoremen, Marine & Transport Workers' association has now five locals of the Marine Cooks' union affiliated with it. The Seamen's union is doing all that it can to stop the deflection of the Marine Cooks' union from its federation.

Port Huron is considering the necessity of building a fire tug in order to protect some important buildings along the water front.

OUR FOREIGN MERCHANT MARINE.

By Harvey D. Goulder.

In February last, the steamer Manchuria for the Pacific over sea trade was launched in the Delaware river. She is the last steamer under construction in the United States for the foreign trade, and on high authority I can say that there is not a contract today for any ship designed for our foreign trade. Our consul at Bergen, the principal port of Norway, imposed fines which had several years before been repealed by congress. In extenuation he said, "The fact that I have been consul here for fifteen years and that this is the only American vessel that I have seen may be some excuse for my ignorance of the law." Last year in the trade between the United States and Europe, not one American vessel entered or cleared for Germany, Russia, Sweden, Norway, Denmark, the Netherlands, Italy, Austria, Hungary or Greece. The United States has a coast line approximating 10,000 miles. It is by nature the premier maritime country in the world. It should also be the principal ship building and ship owning nation in the world. It is among the least of the nations in the foreign carrying trade. It is patent that this condition is not natural but abnormal and must be the result of artificial influence. The maritime development of the United States should be loose-limbed, free-grown, and giant-like under normal conditions. In fact it is a dwarf. A great national influence has been unwittingly exerted to restrain the development of American shipping. The federal government has conferred the benefits of protection upon every industry except our foreign shipping. To make one great exception to the list puts upon the industry so excepted a tremendous handicap, for it has to fight not alone the directly aided shipping of other nations, but the burden of added cost of construction and operation as an inevitable consequence of protection extended to other trades. American shipping is suffering because it has been discriminated against.

The exports from this country for the last year reported, ending June 30, 1903, were $1,420,141,679; the imports for that year were $1,025,719,237, a grand total of $2,445,860,916; the freights paid for transporting these goods were approximately $200,000,000. In American ships we carried a little less than 8 per cent of the exports and less than 6 per cent of the imports. Of the $200,000,000 of freight paid for the transaction of business with this country, American ship owners and the seamen employed on their ships received less than $16,000,000. Of the seamen employed even in this meager share of the business, 31 per cent were native born Americans, 10 per cent were naturalized citizens and the remainder were foreigners.

It was not always so. As far back as 1838 we built in this country 105 steamers of 24,000 tons, while Great Britain built eighty-four steamers of 9,500 tons. From that year, which perhaps distinctly marks the beginning of commercial steam navigation until 1860, our total tonnage engaged in foreign trade increased over 3,350,000 tons against an increase in the United Kingdom of a little over 2,200,000 tons, and the totals were then, for the United States, 5,353,868 tons against for the United Kingdom the total of 4,586,742 tons. In steam tonnage during that time we distinctly surpassed and the figures came to be nearly double in our favor. Up to 1860 the United States made more rapid and extensive progress than Great Britain in the general application of steam to the purposes of navigation. Then Great Britain began to gain superiority by applying steam to the foreign trade, particularly regarding ocean mail service. In one decade they paid $52,000,000 to steamship lines, an amount very much greater than the first cost of the steamships so aided. It is beyond dispute that a leading cause of British ascendancy as a commercial maritime power was due to the aid given to and the influence exercised by steamship lines extending her trade to all the ports of the world. Illustrative of this is the fact that Great Britain pays in postal subsidies and admiralty subventions more than $6,000,000 a year while the United States last year paid a trifle less than $1,000,000 for carrying the mails.

I have tabulated by decades from 1821 to 1901, the foreign carrying trade of the United States, and the percentage carried in American vessels. The total in 1821 was a little over 27,500,000 In 1901 it reached a total of over 2,150,000,000. In 1821 we carried in American ships nearly 89 per cent of this, and in 1901 a trifle over 8 per cent. The progression is still downward and in 1903 we carried a somewhat smaller percentage.

Taking other figures. In 1791 our vessels engaged in the foreign trade had considerably more than three times the tonnage of those of the coasting trade. In 1861 the figures were nearer even, being practically 2,500,000 in foreign and 2,700,000 in the coasting trade. In 1901 we had in foreign trade 879,000 tons against 4,500,000 in the coasting trade. I present these figures to show that not only has the percentage of traffic declined, but there has been an absolute decline in the number and in the ton capacity of ships engaged in our foreign trade. In 1901 we had only one-third the tonnage which we employed in foreign trade forty years before, while the value of the products taken to and from the United States in the same period increased nearly four-fold.

The approximate total amount paid for freightage on the goods taken from this country and brought here is $200,000,000, of which American ships received less than 8 per cent. Here is an industry inseparably connected with our country which aside from any sentimental or broad international question presents this fact. We are paying for the carriage of our goods $184,000,000 to foreigners and the paltry sum of $16,000,000 to our own people. But the condition is more far reaching. The ships which carry the products and manufactures of our country and our imports are built abroad. Ship yards in other countries are teeming with industry. There does not exist in the United States today even a contract for construction of a ship for this service.

Put in another way, we are building up an efficient navy, our people seem disposed to go almost any length in furnishing money for a magnificent navy which shall be a pride and source of strength and glory to the United States, but as matter of fact the government on its men-of-war and other vessels today actually employs more men than are engaged in the entire foreign marine service whose protection is the first office and justification of a navy in any maritime country. Primarily because a nation is maritime, because it has a commerce to protect as well as foster, it has a navy. You do not hear of the navy of a non-maritime nation. In assisting and maintaining the peace of the world, your daily reading of the newspapers will teach that we contribute more than we receive; that we do not receive our proportion of definite and actual aid because we have not the merchant marine and merchant establishments in proportion with other nations.

It is remarkable that this question should be so bandied about as it has been with such failure of result. While it has been under discussion in political platforms and has been urged upon the attention of Congress persistently in presidential messages and the humiliating condition pressed upon the attention of the lawmakers and of the people, the condition has been growing worse for fifty years and never was worse than at this moment. All this time the conditions which are conducive to the building up of our foreign merchant marine have been rapidly growing and increasing until the desirability, I would rather say the necessity, was never so great or the time so opportune as at this moment.

To my mind the important thing today is to bring the people of the United States to realize that great and magnificent as are the advantages of the building of ships in the United States, and the payment of freights to American owners and to American seamen, this almost may be said to be insignificant compared with the national advantages judged

upon the broader monetary standpoint and on lines of national safety.

Does it not mean something that the manufacturer of harvesting machinery in Ohio to attain the best delivery in South America, must and does ship his goods first to Liverpool? Is it not significant that a president of the United States in a message to Congress should state that delegates from South American countries coming to the United States for purposes of conference to extend and enlarge trade relations with South America should be obliged to come from South America to New York by way of Europe? Yet this is the case. Great Britain and Germany and France have established lines of regular communication very much over the world, their merchants and their customers in foreign places may rely upon regularity not only of mail service but in the delivery of goods. Our merchants cannot do this. We have fostered the manufacturing and agricultural industries of this country wisely as shown in magnificent results. That we have burst the bonds of home market and home consumption; that we are coming to, if we have not reached, the position of the world's manufactory, results from our abundant natural resources and the energy and progressiveness of our people, and as abundantly shown in consular reports we have simply pushed our foreign trade against every commercial drawback in its carrying. A general war in Europe would paralyze our industries, because while we might have everything to supply an increased demand, about 93 per cent of what we had to sell must be carried in ships of one or the other warring nation.

It is a matter at once for pride and humiliation that we find in the last report of the commissioner of navigation that in the last ten years the tonnage engaged in the domestic commerce of the United States has increased more than 1,250,000 tons, with an actual decrease in foreign tonnage of some 4,000 tons.

It is a source of pride to us locally that practically one-half of the increase has been upon the great lakes. It is time for the people of the entire country to realize that this matter of foreign merchant marine is not a mere question of the profit of a ship builder or a ship owner; that it is not local to any sea port but concerns the nation.

The question will be asked, "Why, if there is so much business, are not the ships built and employed?" Three reasons are advanced: First, it is claimed, and more or less spiritedly disputed, that the initial cost of building a ship is greater in the United States than in some foreign countries. Second, it is indisputable that by reason of higher wages, better food and other conditions the cost of operating a ship under the American flag is higher than in English ships, and the operating expense of Norwegian and Italian ships is still less. Third, subsidies and subventions obtain in other countries, one of the last being the arrangement between the English government and the Cunard Steamship Line by which in addition to an annual subsidy, brought up to $1,101,000, there is advanced to that company $13,000,000 at 2¾ per cent interest for the construction of two ships larger and better than anything afloat, with an arrangement that they shall be so constructed as to be convertible into cruisers and at command for naval purposes whenever demanded.

Taking up these three reasons for a bare moment's consideration. What is often erroneously referred to as raw materials in ship building are angle irons and shapes ready for the construction, but into which as a matter of fact more than 90 per cent of the cost up to the ship yard is for labor. Iron ore in the ground is raw material. The shapes and beams and plates are 90 per cent the product of labor. It is conceded that we can furnish these as cheaply as any country in the world, notwithstanding the higher wages paid in this country. It is claimed that by reason of the higher wages of shipwrights in this country, the price of building is approximately 20 per cent higher than in foreign countries. This is denied, and I once heard Mr. Cramp say that he could compete in the world's markets in the building of ships. In respect to higher wages and better conditions on American ships, this to my mind is a serious obstacle to unaided private enterprise building up our merchant marine. On the great lakes we have what we proudly regard as the first business fleet in the world. We pay the highest wages and men are better housed, better fed, find all their conditions better than in any other merchant marine. This trade has been built up under laws which gave to American citizens the exclusive privilege of trading between American ports. If in the beginning, or years ago, this trade had been opened to foreign competition, we would have had the cheaply built and cheaply operated foreign vessels. We would never have had the fleet we have, nor the service we have, nor anything like so low a rate of freight which here on the lakes is claimed to be the lowest in the world, despite our fine ships, high wages and good conditions of the men. The same thing is largely true in the coasting trade.

Joining the possibly cheaper construction, the certain cheaper operation, with the subsidies, subventions and other awards granted by foreign governments to their merchant marine, the cold logic of facts and results shows that American capital will not go into ships to inaugurate what at the beginning must be an unequal contest. Every citizen in this country is interested vitally in having a foreign merchant marine which shall measurably give us in peace or in war control of our shipments and imports, which shall give us established routes and definite communication with foreign ports, of which those of South America and the far East are coming to be of vast importance. This American movement would be successful if it could be put on its feet. I do not care except as a matter of success whether it be by any of the means which have been suggested, so long as something effective is done. I would not advocate the doing of anything in that direction if I believed that it had to be indefinitely continued. I have such confidence in American genius and enterprise as to believe that if we could, pursuing the same or better policies than those which other nations have found successful, get our merchant marine on its feet and started, that the same results would be achieved in the foreign trade as have been in our domestic trade. When we were on even terms, America was the mistress of the seas. In this country we are furnishing a domestic transportation by water and by land lower, you will find, than anywhere else in the world. Recently I heard James J. Hill, in an address before a committee of congress, give a comparative statement of the cost of moving a ton of freight 100 miles. He gave the statistics of various European countries and showed for this country less than one-half of the lowest price in any European country. So that whether we take it by land or by water, notwithstanding our larger wages, our larger apparent cost of operation, we have succeeded in producing the lowest price for transportation in the world. I know of no reason why, if our foreign merchant marine rehabilitated under the great American doctrine of protection, or if in any manner given a chance to get upon its feet, we would not in due and reasonable course reach the period where it would be self-sustaining.

At the annual meeting of the stockholders of the Boston & Lockport Block Co. recently, the following directors were elected: Myron H. Tarbox, Boston; Frank Gebbie, St. Johnsville, N. Y.; Albert D. Bosson, Boston; Adelaide C. Beverly, Lockport, N. Y.; and Alfred B. Tarbox, Boston. The directors elected the following officers: Albert D. Bosson, president; Frank Gebbie, vice president; Myron H. Tarbox, treasurer, and Alfred B. Tarbox, secretary. The treasurer's report showed business to be prosperous. The company is preparing a small exhibit of some of their patent specialties for the world's fair at St. Louis.

THE MASTERS AND THE UNION.

Every vessel master might take home to himself and seriously consider the question as to whether he has a moral right to belong to a union. While some of the masters deny that the Masters' & Pilots' association is a union it is in reality a union for its actions have the force and effect of unions. In giving his thought to this subject the vessel master should look at it from all standpoints and argue the matter out with himself. It is not easy to see how he will escape the basic fact: That the principle is wrong. If a thing is wrong it is wrong and no amount of evasion will ever make it right. This article is projected for no other purpose than to cause the masters to do a little quiet thinking in the privacy of their own homes. It is projected in the spirit of fairness as a bit of plain reasoning without bias. The master of a ship occupies a position that is unique. The moment he steps aboard of her he commands. The moment she leaves her moorings he is the absolute and sole authority. The whole majesty of law is back of him. His jurisdiction is unconfined and, for the time being, he is really Cæsar. He is, moreover, the agent of the owner and is solely responsible for the care of the property entrusted to him which, with a modern ship and cargo combined, frequently approximates a half million dollars. Whatever expense he incurs in the management of this floating property, whether wise or unwise, must be borne by the owner. The law upholds him in this and an error of judgment is no exemption from the owner's liability. How can this man then, occupying a position of such authority, whose lightest nod is law and whose orders must be instantly obeyed, belong to the same union with his subordinate? The very essence of unionism is the common level upon which it places all of its members. How can the master be the master of a ship and yet be a member of the same union with his mate? In a question of dispute involving the rights of the owner and the union, which is the master to observe? How can he possibly hold both positions?

At a meeting of the Masters' & Pilots' association held during the present month it was resolved to demand for their members the same or better boats than they had last year. It was also decided to demand a wage schedule which should be operated during the entire season whether the boats should be in commisison for the entire season or not.

Moreover, another provision was inserted which proved to be the stumbling block in the conference with the executive committee of the Lake Carriers' association last week. This provision was one denying the right of discharge to the owner, and so insistent were the masters upon the retention of this provision that the conference adjourned indefinitely. If the masters will think for a moment they will perceive that by insisting upon this provision they are endeavoring to hold their positions by virtue of their union card rather than through merit or competency. There is no doubt about this. It is not mitigated in the least by the fact that the master is rarely removed from the command of his vessel. The number that have been removed during a decade could probably be counted on the fingers of one hand. Owners are especially desirous that their ships be entrusted to careful hands. They are always on the lookout for good men and the good master will never be removed. Therefore, by insisting upon this provision they are virtually maintaining that the union shall support them in their positions, a position which from the owner's standpoint is intolerable. Moreover, the provision is useless, for should a master be removed the owner would undoubtedly replace him with another member of the association, but he would never, no matter what the finding might be, employ him again on board ship. This seems to be a provision that the association could conveniently waive.

As far as the larger fleets are concerned, the provision that the wage schedule should operate throughout the entire season is not especially irksome, but it would work an especial hardship in the case of the owner of a small boat, who having laid her up all season might be tempted, by high freight rates, to operate her for a few weeks during the fall. The wage schedule and classification of vessels as submitted to the executive committee of the Lake Carriers' association by the Masters' & Pilots' association is as follows:

CLASSIFICATION AND SCALE OF WAGES.

PACKAGE FREIGHT BOATS.

Gross Tonnage.	Master.	First mate.	Second mate.
1st class, 2,000 tons or over	$2,250	$125	$90
2nd class, 1,200 tons to 2,000 tons	1,800	120	85
3rd class, 400 tons to 1,200 tons	1,500	100	75

All boats under 400 tons unclassified; compensation for masters and all forward deck officers to be fixed by the local harbor.

CAR FERRIES.

Tonnage.	Master.	First mate.	Second mate.
1st class to include all lake car ferries, all forward deck officers on lake car ferries to be entitled to a continuous vacation of 24 hours every 15 days	$2,500	$125	$100

Second class to include all other car ferries with the exception of St. Lawrence river car ferries. Masters or pilots serving on second class car ferries shall receive $1,600 per year and an extra licensed officer be provided to relieve each master and pilot twenty-four hours every seven days. Third class to include St. Lawrence river car ferries. Master's salary to be $1,000 per year.

The season for all car ferries to be twelve months.

PASSENGER BOATS.

Gross Tonnage.	Master.	First mate.	Second mate.
1st class, 2,000 tons or over	$2,250	$125	$90
2nd class, 1,200 tons to 2,000 tons	2,000	120	85
3rd class, 800 tons to 1,200 tons	1,600	110	80
4th class, 400 tons to 800 tons, per month	150	100	75

All boats under 400 tons unclassified; compensation for masters and all forward deck officers to be fixed by the local harbor.

PASSENGER FERRIES.

Gross Tonnage.	Master.	First mate.	Second mate.
1st class, 500 tons to 1,000 tons	$1,400	$100	...
2nd class, 300 tons to 500 tons	1,300	90	...
3rd class, 175 tons to 300 tons	1,200	85	...

LUMBER CARRIERS.

Gross Tonnage.	Master.	First mate	Second mate.
1st class, 1,000 tons and over	$1,800	$110	$85
2nd class, 700 tons to 1,000 tons	1,600	100	80
3rd class, 500 tons to 700 tons	1,400	95	70
4th class, 300 tons to 500 tons	1,200	90	...

All boats under 300 tons unclassified; compensation for masters and all forward deck officers to be fixed by the local harbor.

COARSE FREIGHTERS.

Gross Tonnage.	Master.	First mate	Second mate.
1st class, 4,000 tons and over	$2,250	$120	$85
2nd class, 3,000 tons to 4,000 tons	2,000	115	80
3rd class, 2,200 tons to 3,000 tons	1,800	110	75
4th class, 1,500 tons to 2,200 tons	1,600	110	75
5th class, 1,000 tons to 1,500 tons	1,400	100	70
6th class, 700 tons to 1,000 tons	1,200	90	65

SPECIAL CLASSIFICATION FOR PASSENGER BOATS.

FIRST CLASS.

Steamers.		
City of Detroit, City of Erie, City of Buffalo, City of Cleveland, City of Mackinaw, City of Alpena,	Master	$2,000 per season
	First mate	1,200 per season
	Second mate	100 per month

SECOND CLASS.

Steamers.		
Tashmoo, State of Ohio,	Master	$1,700 per season
	First mate	1,000 per season
	Second mate	90 per month

THIRD CLASS.

Steamers.		
Frank E. Kirby, State of New York Western States, Eastern States,	Master	$1,500 per season
	First mate	1,000 per season
	Second mate	90 per month

SPECIAL CLASSIFICATION FOR STEAMERS IN THE RUTLAND LINE AND GREAT LAKES AND ST. LAWRENCE TRANSPORTATION COMPANIES.

Masters	$1,700 per season
First mate	110 per month
Second mate	80 per month

When going to their boats in the spring the expenses of masters and mates shall be paid from the lake port nearest their homes to the boat; and when returning home in the fall, or when the boat lays up, they shall be paid from the boat to the lake port nearest their home. Expenses shall also be paid at any time during the season when traveling under instructions from employer.

The season shall commence when the masters are ordered to report for duty on their respective steamers, and end when their respective steamers are laid up for the winter months. Should a master be requested to load or unload such steamer, or to look after repairs on such steamer, it shall be the duty of such master to do so without extra compensation other than such expenses incurred such as transportation or hotel expenses. Such duties to be confined to the steamer that he has been employed on during the sailing season. Furthermore, the master shall be entitled to a full season's salary unless he is discharged for cause, which will be investigated by a committee to be selected from the owners or agents and the directors of the advisory board; and if such cause shall be held to be right, then the master shall not be entitled to a full season's salary but be paid pro rata as follows: The salary to be divided on the basis of 9 months being a sailing season.

WINTER BOATS.

Such steamers as are in commission during the period extending between Jan. 1 to April 1 shall be paid pro rata according to the salary paid during the season of navigation.

The members of this association to have their hotel expenses paid while fitting out and laying up their steamers.

That masters shall have the right to employ their mates or pilots in all steamers. However, relatives of any of the officers shall not be carried in any capacity.

All steamers of 700 gross tons or over shall carry two pilots besides the master and pilot.

When any owner refuses to pay a master's wages no member of this association will be allowed to sail on any steamer belonging to said owner until a settlement is reached. Any master short in his accounts with the owner shall not be allowed to sail until a settlement is made.

We ask that all ships belonging to your association employ all forward deck officers belonging to our association.

DEPLORES ABSENCE OF AMERICAN FLAG.

The Republican state convention of New York adopted the following as a part of its platform last week:

"We endorse the president's action touching the Panama canal. The interoceanic waterway, long desired and vainly sought by the great commercial nations, the short cut from our great centers of commerce on the Atlantic seaboard to Asia and the Pacific islands, and the link that brings our eastern and western coast into neighborly communication, a commercial gain for all the world in time of peace and an American necessity in time of war, is at last assured. Through the prompt acts of a Republican president and a Republican congress our national control thereof is secured. The American flag will float over it forever. We deplore the absence of the American flag from the high seas and the lack of American shipping in the foreign trade, a condition due to the lack of protection for a once great and powerful industry that shed lustre and renown upon the nation and helped to save it from destruction in its earlier days of national peril. We favor the enactment of such legislation as shall give to American-built ships, officered and manned by American citizens, the carrying of the larger part of our foreign commerce, in order that the nation shall have both the ships and the men as resources of defense in time of trouble, and in order that American workingmen may have the building and running of the ships employed in doing our foreign carrying."

PERSONAL.

Mr. J. A. Cuttle, managing director of the Montreal Transportation Co., Montreal, Que., has been elected vice-president of the Dominion Marine Association.

Mr. C. E. Sutton has severed his connection with the Merrill Mfg. Co. of Toledo and is now managing the C. E. Sutton Co. of Toledo of which he is president.

J. W. Kellogg, manager of the marine sales department of the General Electric Co. of Schenectady, N. Y., has written a work upon the uses of "Electricity on Ship Board."

Sumner I. Kimball, superintendent of the United States Life Saving Service, will shortly celebrate his seventieth birthday. He has been continuously in the life saving service since 1871.

W. Carlisle Wallace, formerly of Sheffield, England, has been appointed American representative of John Brown & Co., Ltd., England, and has opened offices at No. 22 Thames st., New York.

Samuel Bettle has resigned his position as chairman of the freight committee of the International Mercantile Marine Co. to accept the vice-presidency and chairmanship of the board of directors of the United Engineering & Contracting Co.

Mr. Robert Logan, assistant general manager of the American Ship Building Co., sailed for Great Britain on Tuesday of this week. He will visit the leading ship yards and will make a special study of the turbine engine. Mr. Logan was given a dinner by his associates last week. He was also escorted to the railway station by a delegation where, notwithstanding the fact that he has been married for a great many years, he was showered with a deluge of rice and old shoes. He will be accompanied abroad by his wife.

The newspapers have it that an order for ten submarine boats has been given to the Holland Torpedo Boat Co. of New York by the Russian government. Five of the submarines are to be built in this country and five by the Vickers-Maxim Co. in England. Incidentally the newspapers remark that submarines cannot travel long distances by their own power and that, therefore, they will have to be carried to the scene of hostilities. It is also naively remarked by the newspapers that the whole five submarines could be stored in the hold of an ocean steamship without putting her many inches deeper in the water. All of which is quite true. The Celtic could carry scores of them without knowing that they were there.

PROGRESS ON THE SHIPPING QUESTION.

Editor Marine Review: For many years accustomed to overlook the course of the "shipping question," I think we are making progress of late—since the defeat of the last subsidy bill. This remark may seem strange to some, but the fact is that six years of lobbying for general subsidy greatly damaged our cause before the country. That it can recover at all is a good sign in itself. The use of the word "aid" in connection with shipping restoration has always been damaging. To talk of "encouragement" or of "protection" has been legitimate. What does navigation want of "aid?" The idea is not American. It is inconsistent with self-respect. Shipping wants justice—that is the word. But for the existence of a shipping question, and a determination on the part of the founders of our government that "America" should possess a marine of its own, for its own commerce, there had been no union under the constitution. A large part—verily, a very large part—of the object of the union and the constitution was the institution of means for the creation and maintenance of an American marine. The third one of the enumerated powers of congress provides for the regulation of our commerce, foreign and domestic, in any manner, just and effective, that will accomplish this grand purpose.

Exercising this power, our early congresses soon compassed the increase and development of our early marine. That marine was a glory to the country. It had not a cent of "aid," but it had "encouragement" and "protection"—justice. Congress secured it the employment that belonged to it. How is it that we have the finest domestic marine in the world? Because congress, in the exercise of its constitutional power—conferred for the purpose—secures to our coasting, lake and river trades the employment that belongs to them—in justice. How is it, if we can have a marine for our domestic trade by the exercise of lawful power, that we cannot have a marine for our foreign commerce, except by a subsidy system? Where can congress find the power to tax the people for such a purpose? Nowhere. It does not exist. The regulation of our commerce is the only way provided, and there is no better way to be found. That way was good enough in the early history of the Republic, and the people will never consent to taxation for the maintenance of a marine, any more than they will for one of a thousand other industries. Why should they repudiate the constitution to "aid" a business, a trade, an occupation, a calling? Do it for one and it would have to be done for others, for all our industries and occupations stand equal before our fundamental law.

The only reason ever advanced for "aid"—monetary aid—is the example of France, Italy, England and other European countries, none of them with limited constitutions like ours. These countries can crown kings and emperors. We must put up with presidents elected by the people. We cannot mix our institutions, or overthrow them to please foreign sentiment. There is a plain American remedy for our shipping ills. We may take it or leave it, and whining will avail not to induce the country to provide for "aid." Why, then, are we wasting precious time on subsidy bills? Verily, the foreign interest now in the saddle of our trade and transportation would pay any sum, for any purpose, to have our governmnet continue the policy under which we have lost our carrying trade. And we have been continuing it for thirty-five years from the time when good statesmanship would have cast it away as rubbish—continuance being just so much protection for our rivals.

They say "treaties" are in the way. Who says this? This is not an honest objection on the part of many, for there are those advancing this "lion of the path" who know better. It is a false fact for a subsidy argument. The "treaties" so-called, are time conventions, with the time expired, and are terminable at the will of either party on one year's notice. We were twenty-six years without one of these conventions, and in that time built up as fine a marine as then existed. The equities of these agreements long ago disappeared. They were expected to prove advantageous—at least not detrimental. But their operation has been ruinous to our shipping interests. Why nurse a felon on our finger? Of forty-two conventions for "maritime reciprocity" but twenty-two remain. Other nations can terminate them, when working to a disadvantage, but we—we must nurse them, cherish them, worship them! Tell the country the truth about the matter, and a subsidy system would not last over night.

About one-tenth of an adequate marine is the extent of a subsidy policy that would provide all the ocean postal lines necessary. The remaining nine-tenths must be encouraged and protected by the proper regulation of our trade. Almost any citizen can understand this proposition. Every patriot, it seems to me, should accept it, and call upon congress to do its duty by American shipping.

WILLIAM W. BATES.
Denver, Col., April 15.

JUDGMENT AGAINST THE UNITED STATES.

After long litigation Judge Adams in the United States district court of New York has decided that the United States must pay the sum of $203,210 to the owners of the British ship Fascolia, which was sunk on May 28, 1898, by the United States cruiser Columbia. On the night of May 28, 1898, the Columbia was doing scout duty off the North American coast, on the lookout for the Spanish fleet under Admiral Cervera. All lights were covered and the vessel was proceeding under orders from Admiral Howell, without sounding the fog signals required by the maritime laws at sea. About 10 miles south of the Fire Island light she collided with the Fascolia which sunk with its cargo and the effects of the officers and crew. The owners of the sunken vessel, Watts, Watts & Co. of London, being English, could not sue the United States until May, 1902, when Congress enacted a special law under which action was brought. Judge Adams, at the commencement, decided that the Columbia was at fault and caused the collision, and that the United States will be as responsible for its vessels at sea as a private owner would be, did it disregard the international rules at sea. A commission, appointed to take testimony in half a dozen cities, rendered a report fixing the value of ship and cargo at $203,210, making, however, no allowance for interest which was claimed from the date of sinking of the ship and amounting to about $80,000. To this report exceptions were filed and opinion of Judge Adams sustains the position that the award of the commissioner covers the full loss.

TURBINES ON THE CONTINENT.

In spite of Admiral Melville's assurance that it will need fifteen years of experimenting before turbines are of any practical or general use on ocean liners and warships, engineers, especially on the continent, seem to be regularly tumbling over one another in their desire to manufacture this class of prime mover. It is not long since the Berlin Allgemeine Electricity Co. joined hands with the General Electric Co. of America to agree as to the building of the Reidler-Stumpf and Curtis turbines, and now the same firm has made a working agreement with Messrs. Brown, Boveri & Co. of Baden, the continental licensees of Mr. Parsons' turbine. Besides this combination of firms there is now another in the field, with the object of pushing the Zoelly turbine. The firms who have entered into this merger are Messrs. Escher, Wejss & Co., the F. Krupp Steel Co., the North German Engineering Co., the Siemens-Schuckert Works, and the United Augsburg and Nuremberg Engineering Co. It will be noticed that two of the firms, the North German and Krupp's, are intimately connected with ship building, a fact which suggests that continental engineers believe in the turbine for marine propulsion. The different works will exchange drawings and patterns so as to economically produce a standard type of machine.

COMMERCE WITH AMERICAN COLONIES.

Commerce of the United States with its noncontiguous territory now averages about $8,000,000 per month, and it is apparent that for the full fiscal year it will aggregate a round $100,000,000. In the term "noncontiguous territory" are included Alaska, the Hawaiian Islands, the Philippine Islands, Guam, Tutuila, and Porto Rico. Records of their shipments to the ports of the United States and of shipments from the various ports to them are now regularly presented by the department of commerce and labor through its bureau of statistics.

These records show that the shipments from the United States to Alaska, Hawaii, Porto Rico, the Philippines, Guam, and Tutuila aggregated in the seven months ending with January, 1904, nearly $21,000,000, and the merchandise received from them in the same period nearly $31,000,000. If to this s added the gold bullion received from Alaska, the grand total of our commerce with the territory in question for the seven months ending with January would amount to nearly $60,000,000, which makes it quite apparent that for the fiscal year ending with June 30 next the total will be fully $100,000,000.

Of the shipments to these noncontiguous territories, the largest total for the seven months under consideration is to Hawaii, $7,224,156 worth of domestic merchandise and of foreign merchandise, $52,677. Porto Rico is next as a purchaser from the various ports of the United States, the total shipments to that island in the seven months in question being $6,454,417 worth of domestic merchandise and $266,910 worth of foreign merchandise. To Alaska the shipments from the United States during the same time were, of domestic products, $3,804,451, and of foreign products, $16,123. To the Philippines our shipments during the seven months ending with January, 1904, were, of domestic merchandise, $2-858,786, and of foreign merchandise, $1,040. To Guam and Tutuila our shipments during the period in question were $21,430, making a total of $20,700,428.

Of the nearly $31,000,000 worth of merchandise received from the territories in question, Hawaii was the largest contributor—$9,749,940 worth of domestic, and $12,275 worth of foreign merchandise. Alaska came next in order, $9,396,415 worth of domestic products and $60,720 worth of foreign products shipped to the United States. The Philippines stood third in the list, the total shipments to the Unted States being $7,784,073. From Porto Rico the shipments during the seven months under consideration were, of domestic merchandise, $3,359,982, and of foreign products, $92,683. In nearly all cases the figures of the seven months ending with January, 1904, show an increase over those of the corresponding months of the preceding year.

To Hawaii our shipments of domestic merchandise in the seven months ending with January, 1904, were $7,224,156, against $6,214,004 in the corresponding months of the preceding year. To Alaska the total shipments of domestic merchandise aggregated $3,804,451, against $3,495,193 in the same months of the preceding year. To the Philippine Islands the total for the seven months ending with January, 1904, was $2,858,786, against $2,268,858 in the corresponding months of the preceding year. To Porto Rico the shipments show a trifling decrease, those of domestic merchandise being $6,454,417, against $7,079,749 in the corresponding months of the preceding year.

Turning to the shipments into the United States from the territories in question, Alaska shows for the seven months ending with January, 1904, domestic merchandise valued at $9,346,415, against $9,895,536 in the corresponding months of the preceding year, and of gold of domestic production $5,-112,645, and of gold of foreign production $8,278,522. From Hawaii the merchandise of domestic production received was $9,749,940, against $7,677,158 in the corresponding months of the preceding year. From Porto Rico the domestic merchandise received was $3,359,982 in value, against $3,946,749 in the corresponding months of the preceding year. From the Philippines the receipts of merchandise were $7,784,073 in value, against $6,535,290 in the corresponding months of the previous year.

POWER BOAT RACING EVENTS.

Power boat racing events for sixteen days were sanctioned last week by the executive committee of the American Power Boat Association, at the meeting held at the office of Secretary Anson B. Cole, 63 Wall street, New York, a resolution was adopted stating that races held by clubs holding membership in the Power Boat Association should restrict the entrance to boats owned by members except in the case of the New York, Larchmont and Eastern yacht clubs. The series of races to be given under the immediate supervision of the Power Boat Association will begin on May 30, Decoration Day, with the special association race off the Columbia Yacht Club, foot of West Eighty-sixth street and the Hudson river. This will be followed by power boat races given by the Columbia club on June 11, and the other club events will be: June 18, New Rochelle yacht club; June 20, New York yacht club at Glen Cove; June 23, 24, 25, challenge cup, on the Hudson, Columbia yacht club; July 2, American Yacht club; July 4, Indian harbor yacht club; July 16, Atlantic yacht club; Aug. 6, Larchmont yacht club; Aug. 11, New York yacht club; Aug. 13, Manhasset bay yacht club; Aug. 18, New York yacht club; Aug. 20, Brooklyn yacht club; Aug. 27, Larchmont yacht club.

WITH THE COAST SHIP YARDS.

The new lighthouse tender Magnolia, built by the Baltimore Ship Building & Dry Dock Co., Baltimore, Md., has had a very successful trial trip. She will be sent to New Orleans to be fitted up.

The Neafie & Levy Ship & Engine Co., Philadelphia, Pa., will install the machinery in the new tug Cecil, launched from Davis' yard, Solomon's Island, Md. The tug is 87 ft. long, 17 ft. beam and 10 ft. deep.

The battleship Rhode Island will be launched from the yard of the Fore River Ship & Engine Co., Quincy, Mass., on Saturday, April 30. This will be the first steel battleship ever launched in New England.

The New England Ship Building Co., Bath, Me., launched last week the five-masted schooner Magnus Manson for Frank W. Benedict of New Haven, Conn. The Manson is 205 ft. keel, 43 ft. beam and 21 ft. deep.

The steamer Jefferson was launched from the ship yard of the Alaska Steamship Co. at Tacoma, Wash., last week. She is intended for the freight and passenger service and was constructed at a cost of about $180,000.

The stern-wheel steamer Fidelgo was launched from the ship yard of Jordan, Johnson, La Conner, Wash., last week. She is 110 ft. long, 20 ft. beam and 7 ft. deep, and is being constructed for the Seattle-Watcom Transportation Co.

Crawford & Reed, Tacoma, Wash., have received contract from the International Fisheries Co., Tacoma, Wash., for the construction of a new steamer 160 ft. long, 25 ft. beam and 13½ ft. deep. She will be named Zapora and is designed especially for the fishing trade.

The Ollinger & Bruce Dry Dock Co., Mobile, Ala., has received the machinery for its new large dry dock and will have it placed in position immediately. As the shipping of the south is steadily increasing, there is little doubt that this new venture on the part of the company will be successful.

The Merrill-Stevens Engineering Co., Jacksonville, Fla., has received an order to build a steamboat for W. T. Gibson of Savannah, Ga., for the route between Savannah and Augusta. The new vessel is to be a steel hull, stern-wheel, double-deck freight and passenger steamer. She will be 100 ft. long.

AROUND THE GREAT LAKES.

The Anchor Line is now prepared to receive freight for Lake Superior ports.

Machinery is now being installed in the giant freighter Augustus B. Wolvin at Lorain.

A cofferdam has been built around the hull of the burned steamer Pittsburg at Sandwich preparatory to raising it.

The package freighter Utica will be launched at the Wyandotte yard of the Detroit Ship Building Co. next Thursday.

The dredge Continental belonging to the Standard Contracting Co. sank in 20 ft. of water at Ashtabula this week.

Fort William reports the first grain charter of the season. It is for 75,000 bu. of wheat at 5 cents a bushel to Montreal.

A cracked cylinder head caused the White Star Line steamer Owano of Detroit to abandon her trip to Port Huron last week.

Capt. Charles E. Moody has been appointed master of the whaleback steamer Christopher Columbus in place of Robert Smith who died about a month ago.

The steamer Canisteo, which has been engaged in the lumber trade, has been sold by A. Weston & Son of Tonawanda to Capt. James A. Madigan of Buffalo.

Capt. James Sanford of Muskegon has sold his interest in the steam barges John Otis and Matthew Wilson. He will retain his interest in the steam barge S. M. Stephenson.

The Pere Marquette railway and Chicago steamship companies have entered into a joint agreement concerning rates for the season, the arrangement becoming effective April 18.

Capt. Fallom, who sailed the Iron City last season, has bought a controlling interest in the J. D. Blaine and will sail her in tow of the steamer P. H. Birckhead along with the Harvey Bissell.

The tug Howard, owned by Capt. James Davidson of Bay City, Mich., was badly damaged at Bay City last week by getting a log in her wheel and driving down against the abutment of a bridge.

After spending five weeks in dry dock as the result of stranding on a reef west of Eagle river last fall, exterior repairs on the steamer J. T. Hutchinson have been completed and she will be ready for business in a week.

Capt. Frank A. Dority has resigned his position with the Pere Marquette Steamship Co. to assume command of the Michigan Steamship Co.'s passenger steamer Eastland. His place of master of No. 15 has been given to Capt. W. J. Barnett, first mate of car ferry No. 18.

Capt. Paul Howell succeeds Capt. Charles Maytham as district captain of the American Association of Masters & Pilots for the great lakes region. Capt. Powell has sailed vessels of the Bradley fleet for a great many years and last season had command of the steamer Gladstone.

The government has built a 75-ft. tower at Stony Point, and hereafter weather signals will be displayed from the tower. The new station will be under the supervision of David Cuthbertson of the Buffalo weather office. The Lackawanna Iron & Steel Co. provided the site for the new tower.

The steamer Desmond and the barge Moran of the Kelley Island Transportation Co.'s fleet encountered some severe weather this week while bound from Kelley's island to Conneaut. They were caught in a severe northwest gale while off Fairport, and had it not been for the skill of Capt. Dickenson of the Desmond, they might have foundered.

Charles McCauley, manager of the Stephenson dock at Escanaba has purchased an interest in the steamer Lotus owned by the Escanaba & Gladstone Transportation Co., and will act as superintendent of the company this season. The officers of the company now are John K. Stack, president; J. B. Morgan, manager; and J. J. Cleary, secretary and treasurer.

The bill which Representative Bede introduced providing for a steam lighthouse tender for service on Lake Superior, to be used by the inspector of the eleventh district, has been inserted in the senate civil appropriation bill by the senate as an amendment and agreed to. The amendment appropriates $75,000 for the new vessel and provides that its total cost shall not exceed $140,000.

Mr. W. R. Bartlett, agent at Cleveland, announces that freight for Lake Superior, south shore ports, West Superior, Duluth and the northwest, will be received for shipment via Union Transit Line on April 25; for Port Arthur, Fort William and the Canadian northwest via Montreal & Lake Superior Line; and for Toronto, Kingston and Montreal via the Merchants' Montreal Line.

The steamer City of Erie of the Cleveland & Buffalo Line was inspected at Detroit last week and is now ready for the opening of the season of navigation. The City of Buffalo is also practically ready for the season's work. The Detroit Ship Building Co. was very expeditious in making the unusual improvements which this steamer has undergone during the past few weeks, including her lengthening by 42 ft.

The Great Lakes Towing Co. has settled its affairs with labor for the season. Last week an agreement was entered into with the tug firemen and linemen, which is satisfactory to both parties. The men get last year's wage schedule. In the event of any misunderstanding the men are to continue at work pending arbitration. The men employed on tugs carrying single crews shall have every third night and every third Sunday off at full pay. The wages of the men employed in the ports of Ashtabula, Chicago, Buffalo, Cleveland, South Chicago and Duluth will be $60, and for those employed in all other ports $55. The winter wages of firemen and linesmen from January 1st to April 1st will be $2 per day for ten hours or less, and for work over ten hours board shall be given.

OBITUARY.

On April 17, Capt. Maurice Barrett died. He was sixty-six years old and most of his life was spent upon the lakes. He was identified with the marine department of the Michigan Central Railroad at Detroit.

Mr. A. G. Lindsay of Detroit, who while not directly interested in vessel property, was identified with lake trade, died at his home this week. Mr. Lindsay was born in Scotland. He was engaged in the lumber business for many years and was a member of the firm of Lindsay & Gamble.

Capt. Albert Spencer, a retired ship master and ship owner, died on Sunday at Brooklyn, N. Y. He had been sailing since boyhood. In 1870 he became surveyor of the port of New York and in 1883 was made chief inspector. He was a trustee of Sailors' Snug Harbor. He retired four years ago.

Capt. J. M. Upham died at Saugatuck, Mich., recently. He spent his boyhood in Cleveland and at the age of sixteen shipped as cabin boy on board a vessel on Lake Erie. He was master of a vessel at the age of twenty-one. Later he built the brig Gladiator and settled at Lorain, O. In 1863 he bought the Carry Woodford and went to Saugatuck to live.

Capt. John Coulter, a retired vessel captain and one of the best known older men on the lakes, died April 14 at his home in Milan. Capt. Coulter was sixty-five years of age; he was known all along the lakes, having been a pioneer vessel man. His last service was as master of the big steamer Yale, of which he was partial owner. Capt. Coulter retired about three years ago.

The Merrill-Stevens Engineering Co., Jacksonville, Fla., is building a light draught river steamer for W. B. Smith Whaley of Columbia, S. C. The steamer is to be 185 ft. over all, 180 ft. between perpendiculars, 30 ft. beam and 7 ft. deep. She will have two Clark compound engines of the tandem horizontal condensing type with cylinders 12 and 29 in. diameter and stroke of 6 ft. Steam will be supplied by two water-tube boilers manufactured by the Taylor Water Tube Boiler Co. of Detroit.

ITEMS OF GENERAL INTEREST.

The Marine Engine & Automotor Co., Camden, N. J., has been incorporated to manufacture marine automobiles and engines. The capital is $50,000.

The Norwegian bark Hermond, Capt. Jansen, from Manzanillo via Havana for Bremen, has foundered at sea in mid-Atlantic. All on board were saved.

In all probability the Ocean Steamship Co.'s vessel, the twin of the City of Macon, building at Roach's Ship Yard, Chester, Pa., will be named City of Atlanta.

The Hyde Windlass Co., Bath, Me., inform the Review that the report that their company had leased the Morgan Iron Works at New London, Conn., is incorrect.

It will be some time before the Boston Towboat Co. will have raised the sunken ferry City of Boston. The boat has a very large hole (6 or 8 ft. in diameter) in the hull.

The report of the collector for the Puget Sound district shows that the foreign commerce of that district last year amounted to $2,327,546 in imports and $5,231,254 in exports.

The Union Iron Works, San Francisco, will launch the United States armored cruiser California on Thursday next. The vessel will be launched by Mrs. Walter S. Martin and christened by Miss Florence Mary Pardee.

The steamship Nebraskan of the American Hawaiian Line steamed nearly 13,000 miles in fifty-two days without stopping for fuel. She burns petroleum entirely. Representatives of the navy department will examine the machinery of the steamer and compile data regarding economy in space, labor, safety and other phases.

The schooner Gardiner G. Deering, which was sunk by the steamer Essex of the Merchants & Liners Transportation Co.'s line, has been raised by the Merrit & Chapman Wrecking Co. and towed out of the channel, so that navigation might not be impeded. The schooner is in very bad condition and will probably be a total loss.

Four of the old civil war monitors have passed into the hands of private parties. The Jason and Nahant go to L. E. Lunt of Melrose, Mass., for $11,868; the Lehigh to R. P. Potter of Fall River, Mass., for $12,052 and the Montauk to Frank Samuel of Philadelphia for $12,059. All the monitors are now at the League Island navy yard.

According to the report filed at the state department at Washington plans have been presented to the czar for the proposed Rega-Cherson canal, which is to connect the Baltic and the Black sea, starting at Rega, a port of the Baltic, and ending at Cherson, a port of the Black sea, a distance of 1,460 miles. The estimated cost is $180,000,000.

It is reported that if George Westinghouse closes with the Parsons Marine Steam Turbine Co. for the manufacture of this kind of steam turbine in the United States a large factory will be established in the vicinity of Pittsburg and that Rear Admiral George Wallace Melville, formerly engineer-in-chief of the United States navy, will have practical charge of it.

Vessels recently classed and rated by the American bureau of shipping in the Record of American and Foreign Shipping are as follow: American screw Shawmut, American schooner Frontenac, American schooner Magnus Manson, American schooner Claremont, American schooner Anthony D. Nichols and American three-masted schooner Carrie A. Norton.

John Rosene, managing director in America for the Northeastern Siberian Co. has bought the fleet of the Northern Pacific Steamship Co. for use in connection with the trading and mining concession this company owns in Siberia. The fleet consists of the Victoria, Olympia and Tacoma, which have been operated for some years past between Tacoma and the Orient in connection with the Northern Pacific railway. The Northern Pacific will replace these vessels with larger and more modern carriers.

A voyage of an unusual character has just been completed by the torpedo boat Flotilla under command of Lieut. Chandler, consisting of the torpedo boat destroyers Decatur, Bainbridge, Barry, Dale and Chauncey. This crew has covered a distance of 12,000 miles more than half way around the world, which is the longest run ever made by vessels of this type. The men who built these torpedo boats were not especially sanguine of their seaworthiness, but they appear to have made the trip without incident of any kind. They are all sister ships of 420 tons displacement and 8,000 H. P. The contract speed was 28 knots per hour.

In the sundry civil bill which has been reported by the committee on appointments these Michigan items are included: $450,000 made available out of the $800,000 balance for the improvement of Detroit river; $500,000 for St. Mary's; $43,900 for the repairing foundation of Spectacle reef lighthouse; and $50,000 for improving the harbor of refuge at Sand Beach. The amounts for river and harbor improvements include the following: Cleveland breakwater, $460,000; Cleveland harbor, $25,200; Black river harbor, $100,000; Toledo harbor, $70,000; and Lake Erie entrance to Black Rock harbor and Erie basin, $125,000; Conneaut harbor, $240,000.

Work in the yard of the Fore River Ship & Engine Co., Quincy, Mass., is tied up by a strike of 2,600 men over a question of hours. The action of the men stopped work on the battleships Rhode Island, New Jersey and Vermont. The strike followed the refusal of the company to accept a schedule presented by the employes for a Saturday half-holiday in June as well as in July and August, and providing for fifty-four hours of work in each week. As a counter plan the company proposed a schedule of fifty-five hours for the work, with pay for the extra hour. It was rejected. Unless the difficulty is adjusted the launch of the battleship Rhode Island, set for April 30, may be delayed.

The navy department has decided that the North Atlantic battleship squadron and the large cruisers on this side shall not take part in joint war games with the army in the coming summer. If any war games are to take place the navy will probably furnish some small gunboats and tugs to operate against the coast defences. In the opinion of the naval authorities these games involve too great risk to costly warships without any corresponding benefit to the navy. It is held that the army will learn just as much if tugs and gunboats are used. If any of them should get wrecked the loss would be only a few thousand instead of several million dollars as it would be if a battleship went down or on the rocks. During last year's war games the Massachusetts and the Olympia got big holes knocked in their bottoms, and the year before the Brooklyn struck an uncharted rock while leaving New Bedford harbor after an attack on that place. All these vessels were laid up for several months.

A rather unusual advertisement is being projected by British manufacturers on the Beaver Line steamer Lake Megantic. This steamer has been regularly visiting Montreal for a number of years, but she is now to be converted into a huge commercial traveler. Her tour will include all the British colonies. She will sail from London on April 27 and her first place of call will be Halifax, from whence she will proceed to St. Johns, Newfoundand, and then visit Quebec and Montreal. From Canada she will sail through the West Indian Islands to South Africa. From Durban she will proceed to Bombay and thence to Columbo, Madras, Calcutta and Rangoon. She will then steam through the Straits of Malacca, touching at Singapore and then on to Hong Kong, Shanghai, Nagasaki and Yokohama. The long run will then be taken across the Pacific to Brisbane, after which she will visit Sidney and Melborne and strike across to South America, around the horn and calling at Buenos Ayres, Montvideo and Rio Janiero; crossing to South Africa, Sierra Leone will be visited, after which she will return to her starting point. The purpose of the cruise is the promotion of inter-imperial commerce. One hundred and fifty trades and industries will be represented in this immense floating showcase.

TURBINE POWER PLANT FOR BOSTON NAVY YARD.

An interesting departure in engineering practice by the authorities of the United States navy, department of yards and docks, is marked by the introduction of Westinghouse-Parsons steam turbines for furnishing power for lighting the buildings and yards, and power for operating dry dock pumps and miscellaneous machinery. The initial installation of this character is in process of construction at the Charlestown navy yard, Boston, Mass., and for the present one Westinghouse-Parsons turbine generating unit of 750 K. W. capacity will be placed in service. This turbine will be of the new short-barrelled type and is now under construction at Pittsburg. A Worthington surface condenser will be employed, using salt water for circulation. The condensers will be located between the foundations, which consist of concrete piers. A running vacuum of 28 in. will be secured through the aid of a dry air pump. Steam will be furnished at 150 lbs. pressure by Babcock & Wilcox boilers in units of 350 H. P., equipped with Roney mechanical stokers. Coal superheaters in the boiler settings will furnish to the turbine a superheat of about 100° F. The boiler house will be equipped with a complete outfit of coal and ash handling machinery.

The present power plant is the outcome of an appropriation made in 1898 by congress for a dry dock and pumping plant to be located at the Charlestown navy yard; the new plans for a dry dock equipment providing for a power plant located near the outer end of the new dock with piping connections to both old and new docks so that the one pumping plant would be able to handle them simultaneously or separately. During the period of construction of the new dock the department of yards and docks at this navy yard underwent considerable enlargement, necessitating an immediate increase in an electrical generating equipment for supplying light and power to buildings and departments.

In view of this situation, it was decided to supersede the dock pumping plant, originally provided for, by a central lighting, power and heating plant for the entire department, although retaining the dry dock pumping equipment which will now be electrically driven from the central station. It is also intended to supply from this plant electric light and power to the vessels docking which do not happen to be under steam. The power system as now under construction is, therefore, considerably more comprehensive than originally laid out. The turbine plant will supply 3-phase alternating current at 2,300 volts, this voltage being used for general distribution and for direct use in larger motors, while for lighting, lower voltage will be provided by transformation. The turbine generator will be served by a 37½ K. W. Westinghouse compound exciter unit. The engineering work is under joint execution by the department of yards and docks and the constructing engineers, Westinghouse, Church, Kerr & Co., who are installing the plant.

EFFECT OF TORPEDOES ON WARSHIPS.

The question of submarine mines or torpedoes, their effect on warships, the chances of hitting, and their general efficacy in the defense of harbors has always been an interesting one because the history of recent wars has added very little to the literature of the subject. In order to obtain some reliable data for use in war, Great Britain recently subjected the Belleisle (already famous for the trial of fire to which she was subjected a year or two ago) to still further experiments. A Whitehead torpedo was exploded against the ship's bottom, and as a result she heeled over and sunk in twenty minutes. There was a depth of water of 10 ft. under the keel of the Belleisle, which had been moored in Porchester Creek, at Portmouth, England. A compartment, filled with corn-pith cellulose, had been built outside the port bow below the water line, the torpedo was lashed by divers under the compartment, and fired electrically from the Vernon. When the torpedo exploded a spray rose about forty feet into the air, the explosion not only smashing the special compartment and blowing the cellulose into the air, but also tearing open the side of the ship and leaving a hole 8 ft. by 12 ft.

The experiment proved conclusively the destructive power of the torpedo, and incidently showed that the plugging power of cellulose was not what theory had ascribed to it. It was altogether one of the most important experiments ever carried out with the Whitehead torpedo, since the ship had been so strengthened below the belt that she really was superior in resisting power to any warship afloat.

Admiral Fremantle, in commenting on the results of the experiment, says that if the damage done to the Belleisle was as great as he had been informed it was, the power of the torpedo had been underestimated in the past. Of course, there is always the difficulty of torpedoing a ship when steaming at high speed by means of a submarine. The extreme range of the torpedo is but 2,000 yards, and its maximum speed 30 knots, so that it will be very difficult to strike a ship moving at 18 knots speed. Submarines when submerged have a speed of only 8 knots, and will consequently have difficulty in getting within range of ships in motion. Their menace to vessels at anchor, however, does not admit of question. Moreover, the efficacy of submarine mines planted in channels is also unquestioned, and in consequence the above experiment is a matter of great satisfaction to the coast artillery, which has charge of the submarine mine defense.

NEW MARINE RAILWAY AND DRY DOCK

The harbor at Vancouver, B. C., will soon be equipped with much better docking facilities than at present. The Victoria Machinery Depot Co. are about to install a marine railway and dry dock of large size. The plans for this structure have been prepared by the H. I. Crandall & Son Co. of Boston. They show a dock which will be 65 ft. wide and have a length of 264 ft. on the keel blocks, and a carrying capacity of 3,000 tons. Very solid construction has been employed throughout, all the under framing being heavy structural steel, and the dock floor and sides of heavy timber work. Messrs. Crandall & Son are sparing no expense to make this a model of its kind, and have placed the inspection of the steel work in the hands of the De Lano Osborn Engineering Co. of Toronto. The steel has been ordered from the mills and the work will be finished as rapidly as possible so that the dock may be in service by the middle of the navigation season or perhaps even sooner. When completed, this will prove a very welcome addition to the port's equipment for handling large vessels.

DENSITY OF WATER DOES NOT INCREASE.

A coin dropped into the sea will sink to the bottom, however deep it is, owing to the fact that the metal is heavier than the volume of water that it displaces. It is a common but mistaken notion that the density of the sea increases with its depth and consequent pressure, as does the density of the atmosphere, which we all know is greatest at the earth's surface. The air, however, like all gases, is elastic, and, when under pressure (as with its own weight), shrinks in volume and gains in density. Water, on the other hand, is absolutely incompressible, and, although the pressure in the sea increases at the rate of about one pound for every two feet we descend, the density of the water remains the same; consequently the penny continues to outweigh the water it displaces and the coin sinks until it finds a solid resting place. The pressure of the water has no influence at all on the coin, acting as it does on all sides equally.

The Clyde liner Iroquois' steering gear became disabled off Cape Hatteras during a storm last week, but she was successfully brought into harbor.

MITCHELL VALVE RESEATING MACHINE.

The Mitchell & Mitchell universal valve reseating machine is a recently perfected tool for renewing the seat surfaces of steam pumps, globe valves, etc. The machine comprises a cutter holder or chuck at the end of a stem which can be readily applied in suitable position for accurately facing the valve seats. The cutters are plain straight lengths of tool steel carefully hardened and fitting a recess in the cutter holder. The recess is made with ample bearing for the support and grip of the length of tool steel serving as a cutter. It will be seen that the cutter is in contact with the holder only on the back and edges and therefore the cutting teeth may extend along the entire area of the tool and the workman may thus take a chip close to the center of the circle covered by the cutter. This is a point of some importance in light work where the opening through the seat is of very small diameter. The cutter has a series of grooves cut parallel to each other and about an angle of 60 degrees to the sides of the blade. These are spaced ten to the inch though other intervals between the teeth have been employed with satisfactory results for special purposes. These are made at present for cutting all flat seat globe valves from ¼-inch up to 4 inches diameter and all flat or web seats of steam pumps from ¼-inch up to 5¼ inches. The cutters, as has already been intimated, are of uniform width and will fit three styles of tool holder.

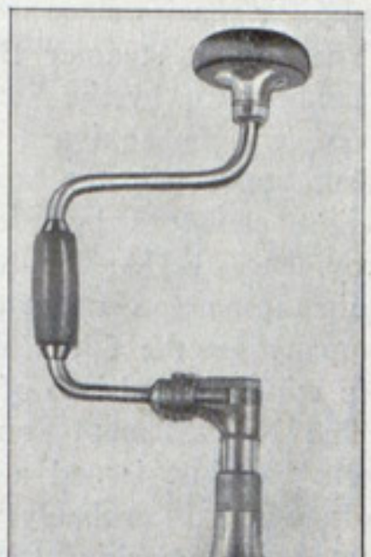

FIG. 1—RESEATING 2-INCH GLOBE VALVE WITH MITCHELL MACHINE.

The different styles of holder and stem have plain or threaded stems with bushings to act as guides in the larger valves. The neck of the valve can in the smaller sizes be employed as the guide, as is illustrated in Fig. 1, where the necessary power is applied through a brace in reseating a 2-inch globe valve seat. The stems are made in a variety of forms and lengths to admit of use through side openings or hand holes on lower seats of a pump or for similar purposes. An eccentric bushing is provided for the purpose of adjusting the cutting tool to any possible variation there may be between the surface to which the supporting arm is attached and the valve seat itself. When the mark on the arm and another in the bushing are in agreement the cutting tool will be set true with the face and bore of the arm, but by rotation of the bushing in the arm the cutting tool may be varied from this position up to a taper of 1-16 to the inch. When the tools are in the desired position to operate accurately on the seat the sleeve is set down on the spring with the tension adjuster turned up to the top of thread and the grip in arm is tightened to hold the sleeve rigid. The lowering of the tension adjuster can now be made until the required pressure on the tool is obtained, the grip secured and the machine is in position for operation.

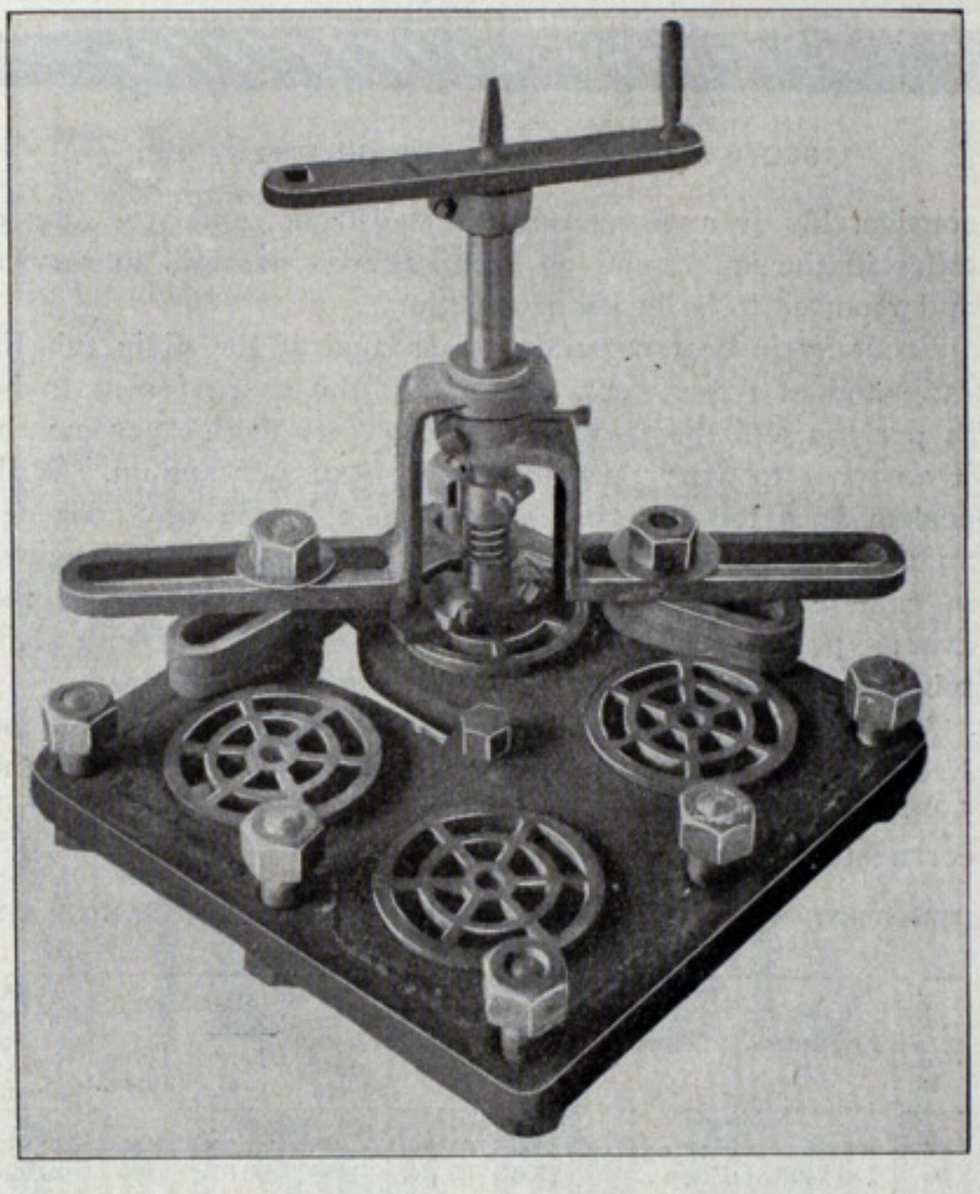

FIG. 3—RESEATING TOOL ON STEAM PUMP DISC WITH WEB SEATS.

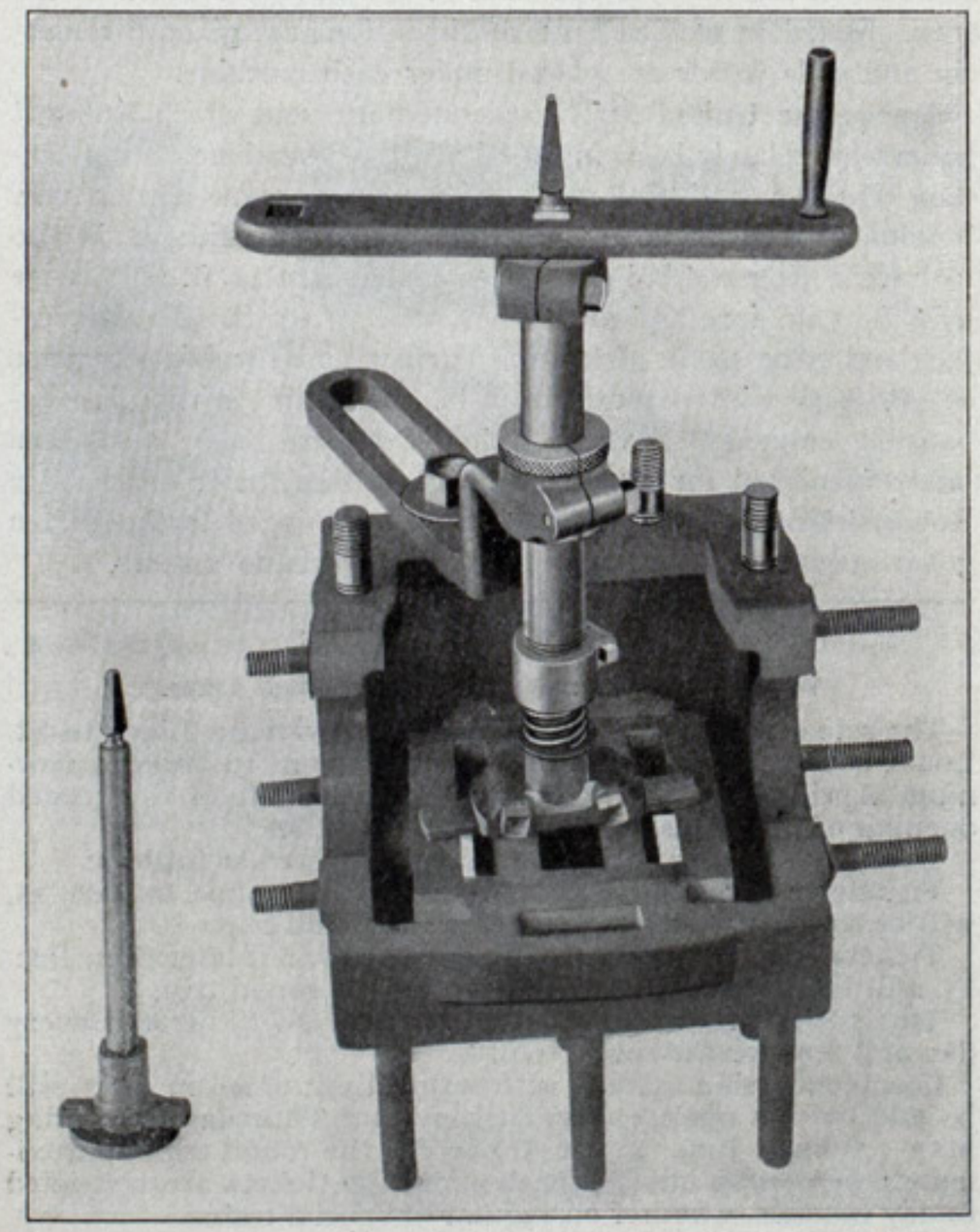

FIG. 2—RESEATING TOOL ON THROTTLE SEAT OF STEAM STEERER.

A grip collar is used for limiting the drop of the cutter when starting on an uneven surface and may also be employed in reducing the cut when finishing up work to ensure a perfect face. The collar is illustrated in Figs. 2 and 3. Fig. 2 shows the Mitchell machine ready for work on the slide valve throttle of a steam steerer. This work is done by the use of a tool which will turn between the walls or housing of the chamber and thus cutting away in a circle the amount equal to the smallest dimension of the steam chest. The cutter is then removed and shorter cutters employed, the machine set over in each corner and the face cut down to the depth left bv the first operation. It was a task of this type that led up to the development of the tool, and the simple rig suggested for the work will materially cut down the time of nibbling away with hand operated chisel and

file in such limited quarters. Fig. 3 shows the reseater as applied to the valve disc faces of a Laidlaw-Dunn-Gordon 8 x 4 x 10 in. plunger steam pump. The bonnet has been removed and the cutter stem has a double bearing to secure greater rigidity with the device. For shorter distances the single arm will probably be quite sufficient. The valve seats illustrated in Fig. 3 are of the web type and 3½ inches diameter. The reseating tool is made by J. D. Mitchell, Perry-Payne building, Cleveland, agent for the Mitchell brothers, the patentees.

SPIRALLY CORRUGATED TUBES.

The New Jersey Tube Co., Newark, N. J., has issued some interesting data concerning the life and economy of their patent spirally corrugated tubes. It is claimed that the life of the corrugated tube is nearly if not quite double the average life of plain tubes. These tubes have been in constant service on the Boston & Maine and on the New York, Ontario & Western railway for the past five years, having made

SECTION OF SPIRALLY CORRUGATED TUBE.

considerably over 108,000 miles in the former and over 240,000 miles in the latter, and on both railways are still in service and reported to be in good condition.

Economy in coal consumption as against the plain tube is estimated at 8 per cent. Assuming the cost of coal to be $1 per ton and the saving 8 per cent. per engine per month, it amounts to $16.75 per month, or $201 per annum. With coal at $5 a ton it would amount to a saving of $1,005 per annum. Multiplying these figures by the number of engines in commission an enormous saving results. Moreover, the average pressure with corrugated tubes exceeds that with plain tubes so that there is always an abundance of steam.

Mr. Geo. W. West, superintendent of motive power on the New York, Ontario & Western Railway Co., compiled the following data of the performances of engines equipped with corrugated and plain tubes:

PERFORMANCE OF ENGINES EQUIPPED WITH CORRUGATED AND PLAIN TUBES.

No. Engine.	Engineers.	Tubes.	Mileage.	Lbs. coal used.	Weight train hauled in net tons.	Per Mile.		Tons hauled per ton coal used.
						Lbs. coal.	Tons hauled.	
67	Ryan	Corrugated	1200	63,300	1338	52.75	1.11	42.28
69	Larkins ..	Plain	1200	60,800	1188	50.67	0.99	39.08
.....				.....	....	....		8.18%

There is a further advantage in that the corrugated tube acts as a spark arrester and therefore minimizes the danger from fire. This is undoubtedly due to the longer distance which the spark has to travel in the tube before reaching the front end and smokestack. The rotary motion inevitably involved in passing through the corrugated tube, forces the sparks in contact with every part of the tube from start to finish and greatly increases the absorption of the heat by contact with the metal.

TRADE NOTES.

A special spring number of Hardware and Metal of Toronto, Ont., was issued recently. It is a very creditable number, indeed.

The Nernst Lamp Co. has recently removed its Boston office from 131 State street to No. 501 Atlantic avenue. The office will, as heretofore, be in charge of Mr. Geo. C. Ewing as district manager, and will carry a complete stock of Nernst lamps and supplies, insuring prompt service to customers.

That the Allen portable pneumatic riveting machines built by John F. Allen, 370-372 Gerard avenue, New York, will not only do good work, but continue to do it without constant repairs, is confirmed in a statement recently made to the manufacturer by Mr. Wm. F. McNeill & Co., New Glasgow, N. S., Canada, who says: "The riveter purchased of you June 27, 1901, is giving us every satisfaction and has not cost us one penny for repairs since we put it in the shop."

The freight steamer Boston, building for the Old Colony Steamboat Co. by the Fore River Ship & Engine Co., Quincy, Mass., will be equipped with a steam capstan windlass forward, steam capstan aft and two steam winches for the freight elevators by the American Ship Windlass Co. of Providence, R. I. The American Ship Windlass Co. will also equip the passenger steamer Providence building by this same company for the Old Colony Steamboat Co. with its vertical ship windlass and two of its steam gypseys.

The Niles-Bement-Pond Co., 136-138 Liberty street, New York, has just issued a new 750-page catalogue of machine tools, which is probably without exception the most complete catalogue of machine tools that has ever been published. It is a tremendous affair from the catalogue standpoint and is, as well, a striking example of the printing art. The book is bound in red, the wash drawings and half tones are in black, and the letter press in brown. The catalogue opens with six full-page illustrations of the various works of the Niles-Bement-Pond Co., and following these are thirteen pages of medals and diplomas awarded the various constituent companies of this concern. The reproductions of the medals are particularly excellent. Then the serious business of the catalogue begins. First are the machines for railroad shop use, then comes a division devoted to lathes, including all sizes from the Pratt & Whitney bench lathe to the massive Bement 125-in. crank shaft lathe. Fifty pages are devoted to planing machines. More than fifty pages are devoted to boring machines and turning mills. Then comes the collection of miscellaneous machine tools. Particular care has been taken to put the various machines in their logical order, so that any machine can be found without reference to either the table of contents in the front of the book or the complete index at the back. Metric as well as English dimensions are given throughout and code words are placed under each machine.

Among the United States revenue cutters in which Roberts' boilers have lately been installed are the Mackinac, Winnisimmet, Hudson and Calumet. The new revenue cutter now building by the Spedden Ship Building Co., Baltimore, is also to have a Roberts' boiler. These boilers are 11 ft. 6 in. wide by 9 ft. 3 in. fore and aft. They have 70 sq. ft. of grate surface and 2,800 sq. ft. of heating surface and furnish about 700 H. P. each with natural draft in connection with triple-expansion engines. Several Roberts' boilers have also been lately furnished for revenue cutters on the Pacific coast. Six Roberts' boilers have also recently been shipped to the Cuban government for installation in Cuban revenue cutters.

FARES TO ST. LOUIS.

World's Fair Excursions via Pennsylvania Lines.

The sale of excursion tickets over Pennsylvania Lines to St. Louis, account of the World's Fair, will begin on Monday morning, April 25, five days in advance of the date of the formal opening of the Louisiana Purchase Exposition.

The excursion fares from Cleveland are fixed as follows:

Tickets good for the season, returning any time to Dec. 15, will be sold every day at $24.00 for the round trip.

Tickets good returning within sixty days, not later than Dec 15, will be sold every day at $19.00 for the round trip.

Tickets good returning within fifteen days will be sold every day at $16.00 for the round trip.

Coach excursion tickets, with return limit of seven days, will be sold twice a week, every Tuesday and Thursday, beginning May 17, until June 30, at $12.00 for the round trip, approximately one cent a mile. Coach excursion tickets are restricted to day coaches, whether on regular or special trains.

For further particulars write or call on Geo. W. Weedon, D. P. A., No. 1 Euclid ave., Cleveland. Apr. 25

WANTED and FOR SALE Department.

FOR SALE.

Schooner for Sale.

For Sale —Schooner Minnie Slauson. 317 gross tons. Rated A 2. For information inquire of Capt. L. Larson, 812 Huron St., Manitowoc, Wis. tf

Tug for Sale.

Tug Duncan City. Address, Geo. Pankrantz, Lumber Co., Sturgeon Bay, Wis. tf

Propeller for Sale.

A four blade built up manganese bronze Propeller, right handed, 9 ft. 2 in. diameter, pitch 10 ft., adjustable 6 in. either way, for sale; also two breech loading brass cannon, 42 in long, 2½-in bore, with reducers for using 1¾-in. shells; also guns and plan of wheel at Marine Manufacturing Supply Co., 158 South st., New York. Apr 21

Tug for Sale.

Tug Frank Canfield, 75 ft. long. Engine 18 x 20, boiler 6½ x 13. Address Canfield Tug Line, Manistee, Mich. Apr. 28

Diving Outfit For Sale.

Three iron bound cases containing a complete diving outfit for $175 cash. The suit and equipment is in first-class working order with 70 ft. new air hose. Bart E. Linehan, Dubuque, Ia. May 5

FOR SALE.

Steamer for Sale at Cost, $13,500.

The old Anchor Line twin-screw steamer Gordon Campbell. Two decks, gangways, hoisting machinery, etc. Suited to carrying coal, lumber, ties, package freight, etc. Spent $3,500 in repairs this year. Other business requires my undivided attention and I will sell for cost to me. W. F. Carroll, 1011 Ashland block, Chicago. tf

Yacht for Sale.

New beautiful 100-ft. steam yacht, fully equipped. Owner physically unable to use yacht. Will sell for any reasonable offer. Yacht can be seen in Detroit. Address M. J Steffens, 57 East Twenty-second st., Chicago. tf

Two Steamers for Sale.

The Union Transit Co. in closing out its business offers the steamers John M. Nicol and Eber Ward for sale.

The steamer John M. Nicol is of the following dimensions: length 263 ft., beam 41 ft., depth 26 ft. Triple expansion engines with 900 indicated H.P. Steel boiler-house enclosing two Scotch boilers with steam pressure of 150 lbs. About $30,000 laid out for repairs on this steamer in the past year.

Steamer Eber Ward.—Length 213 ft., beam 37 ft., depth 23 ft. Engines F.& A. compound with an indicated H.P. of 600. One Scotch boiler with steam pressure of 110 lbs.

For further information apply to H. C. French, 900 Ellicott Square, Buffalo, N.Y. May 12

FOR SALE.

Chicago, Saugatuck & Douglas Trans. Co.

This boat line (two steamers, docks, etc.) for sale. For particulars apply to Griffin & Henry, Saugatuck, Mich. May 5

Barge for Charter.

Barge William Case, of 266 gross tons, to let for the season. A money maker for some owner or captain of a steamer who could use her as a consort. For further particulars address, Box 62, care Marine Review, Cleveland, O. Apr. 21

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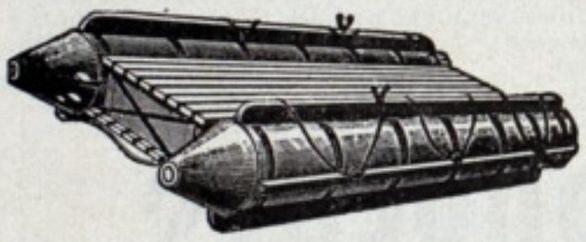

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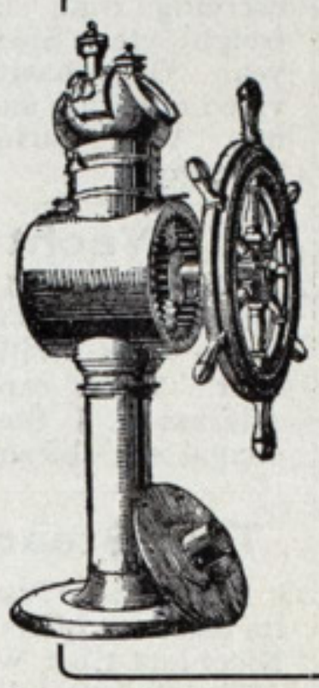

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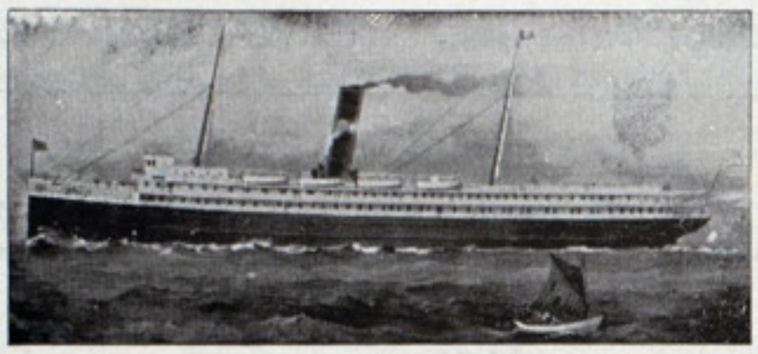

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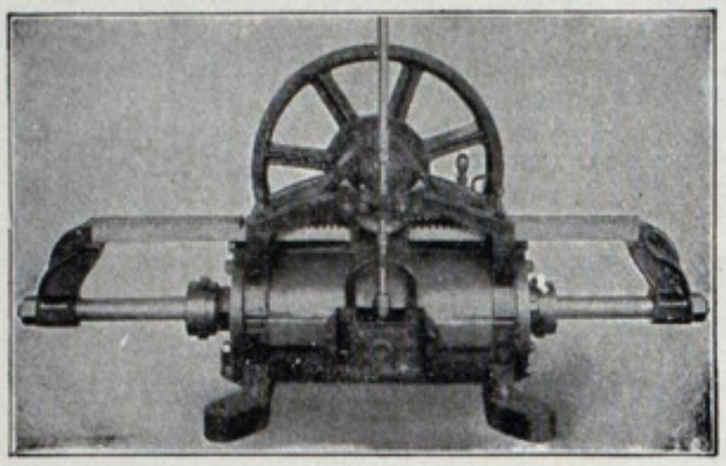

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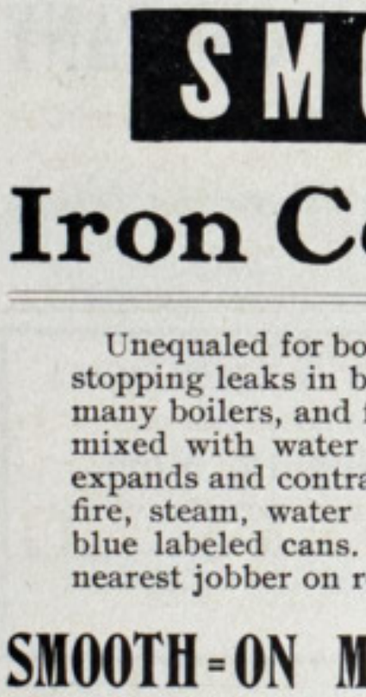

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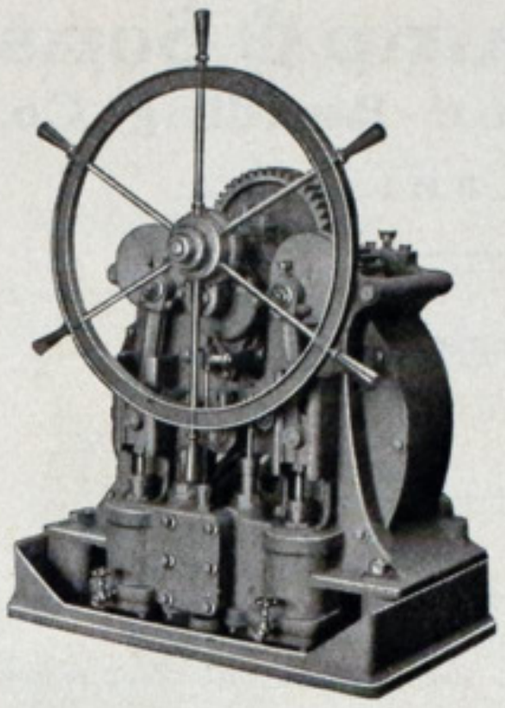

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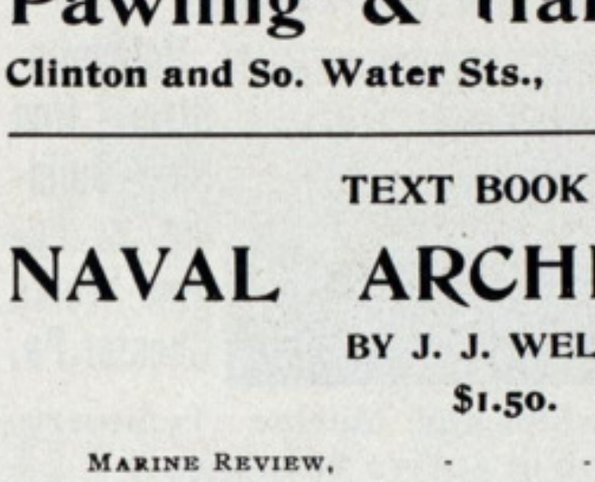

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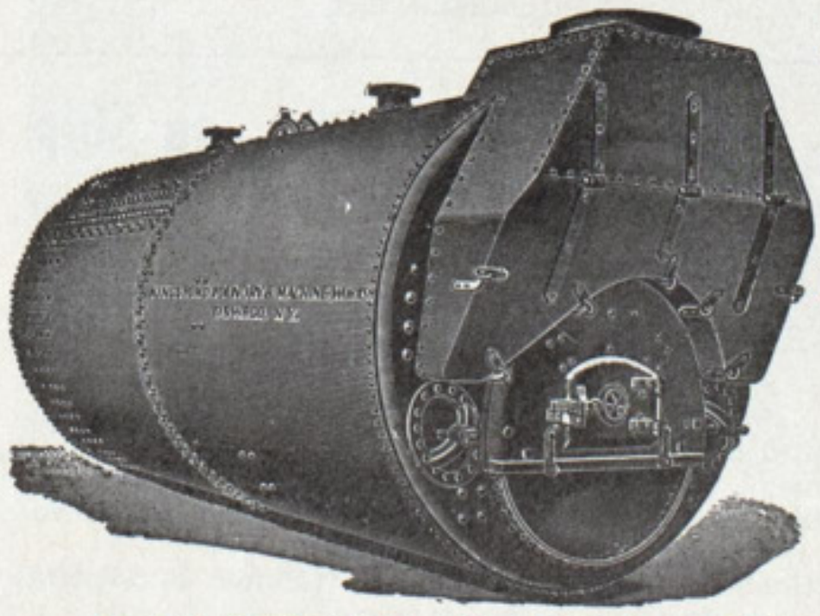

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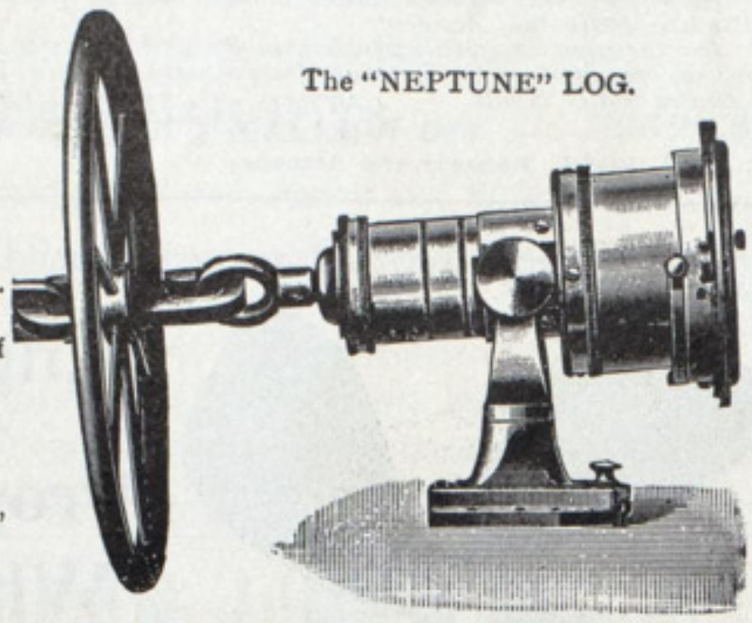

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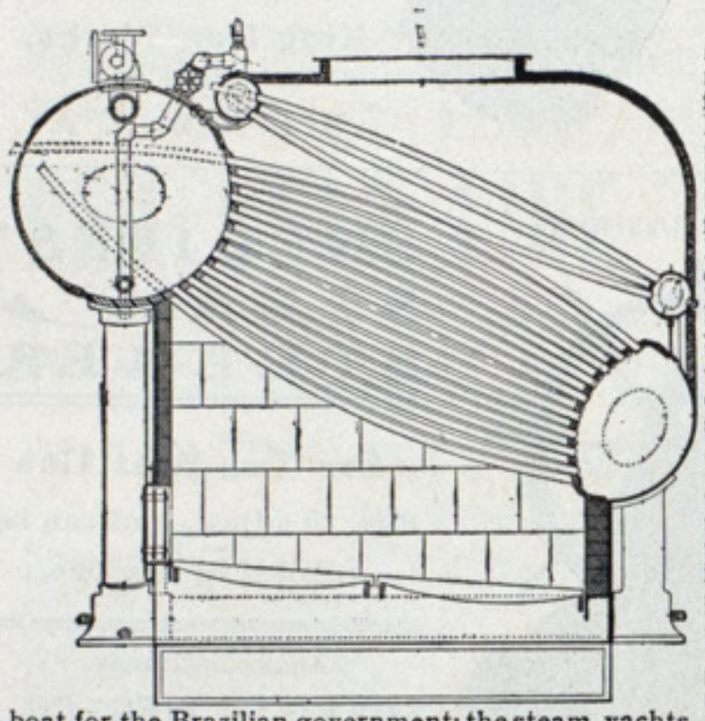

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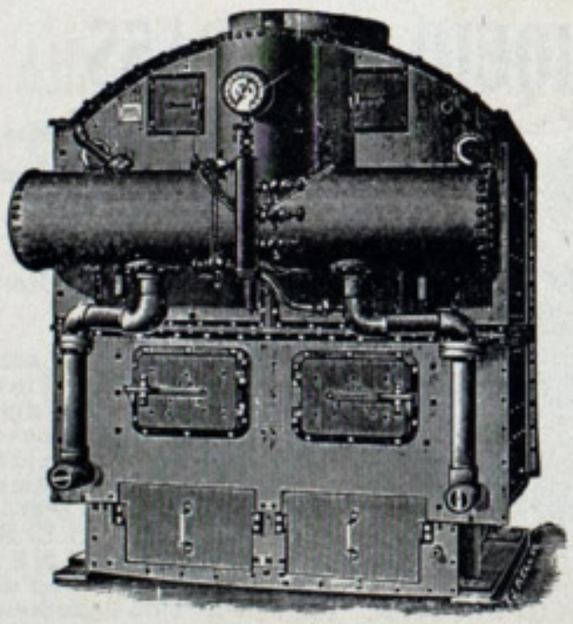

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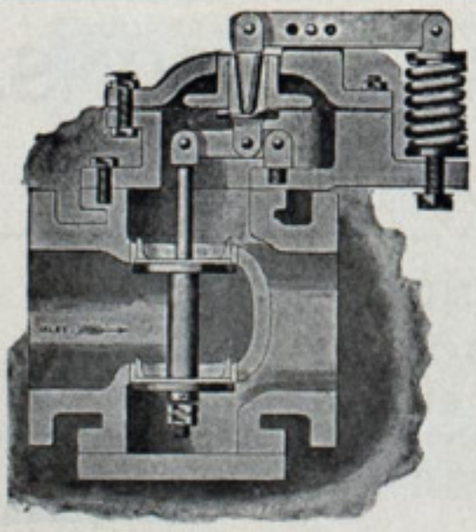

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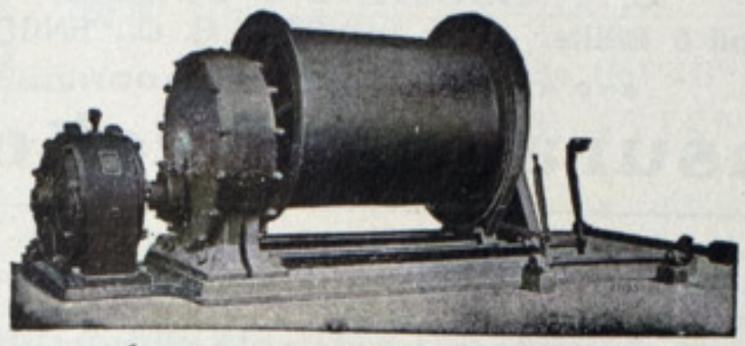

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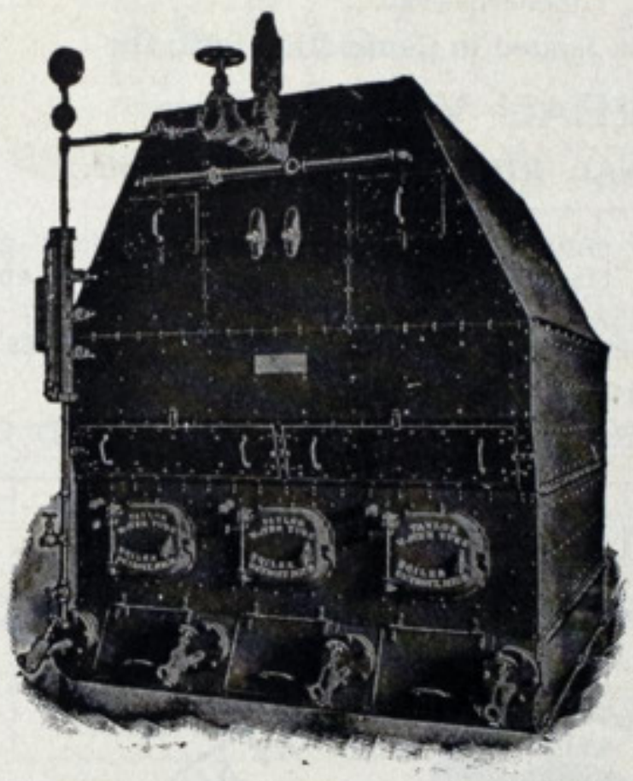

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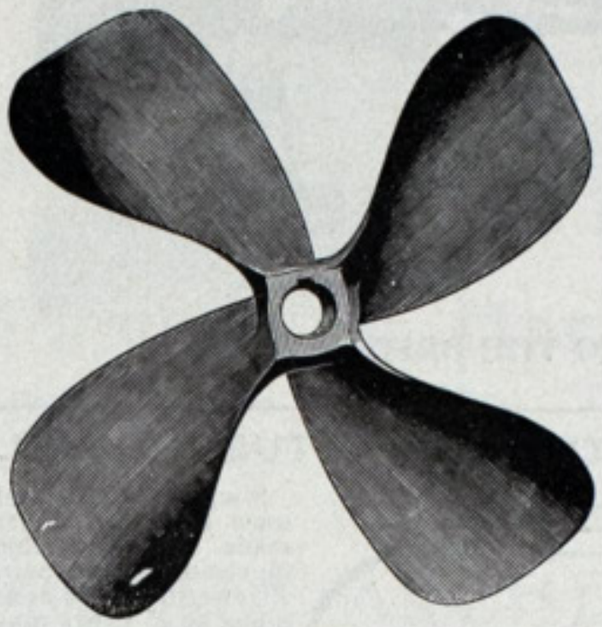

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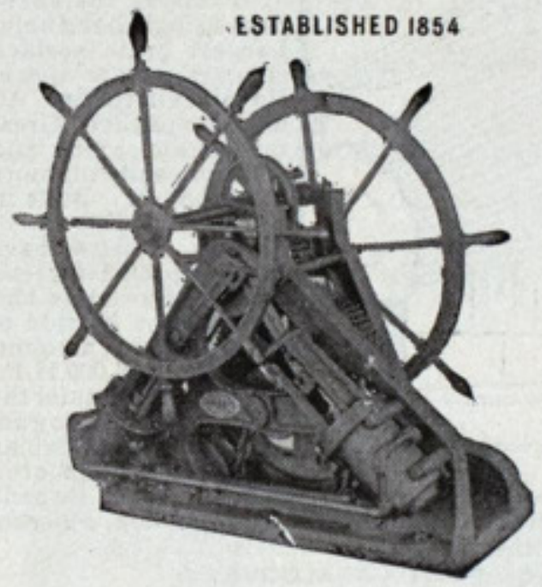

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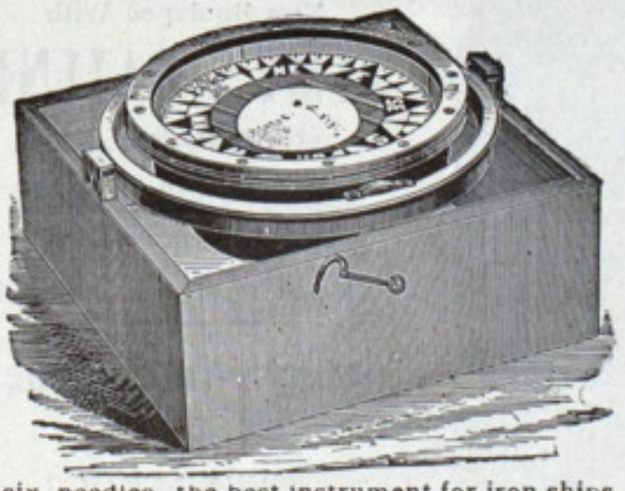

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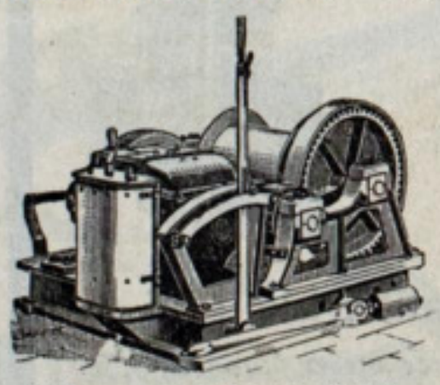

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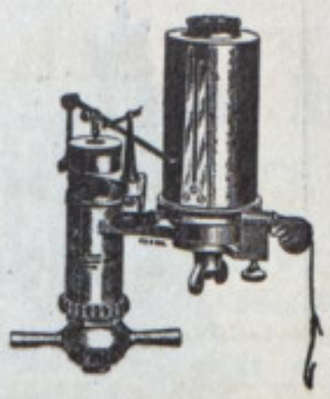

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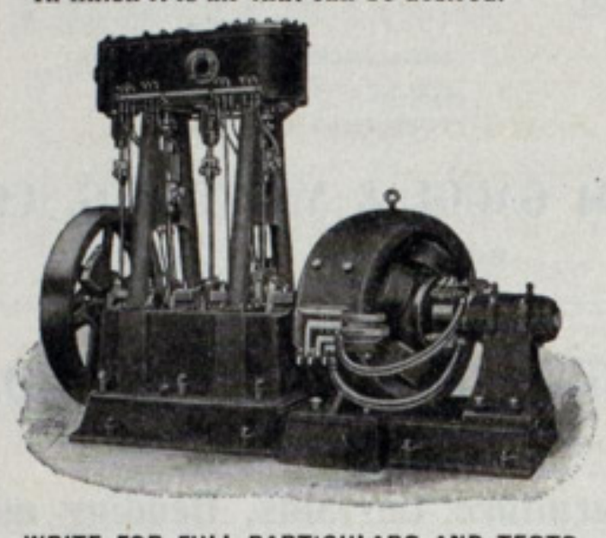

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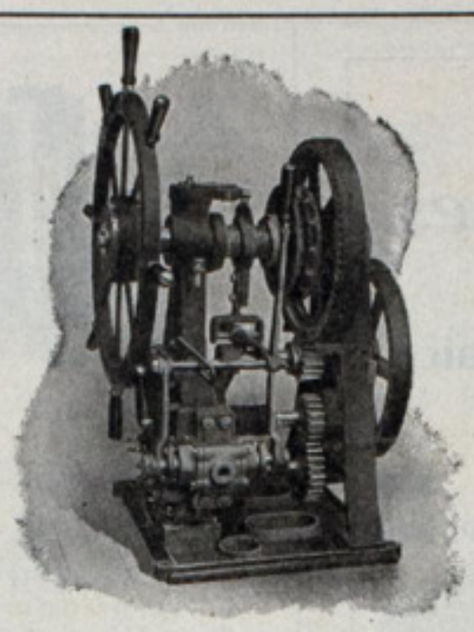

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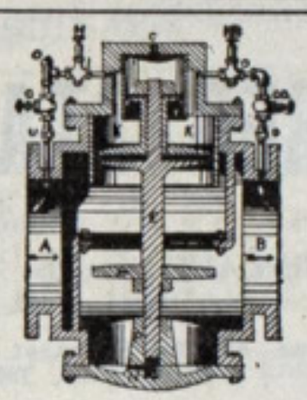

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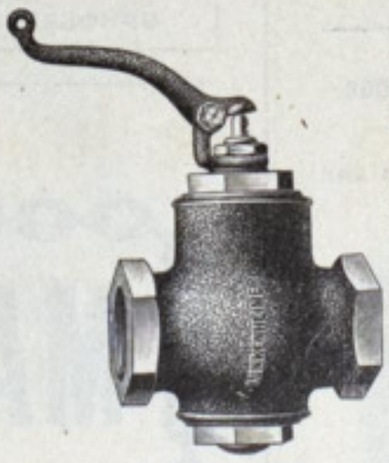

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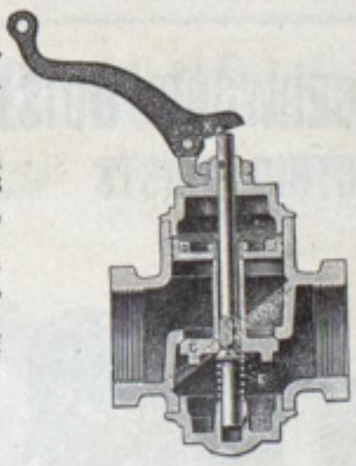

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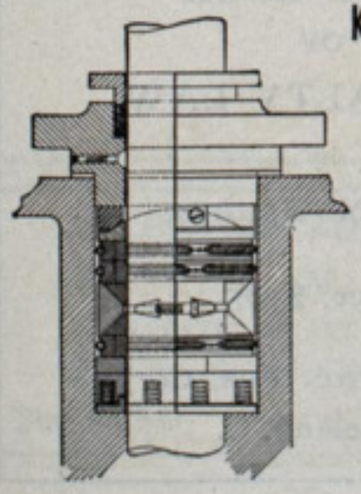

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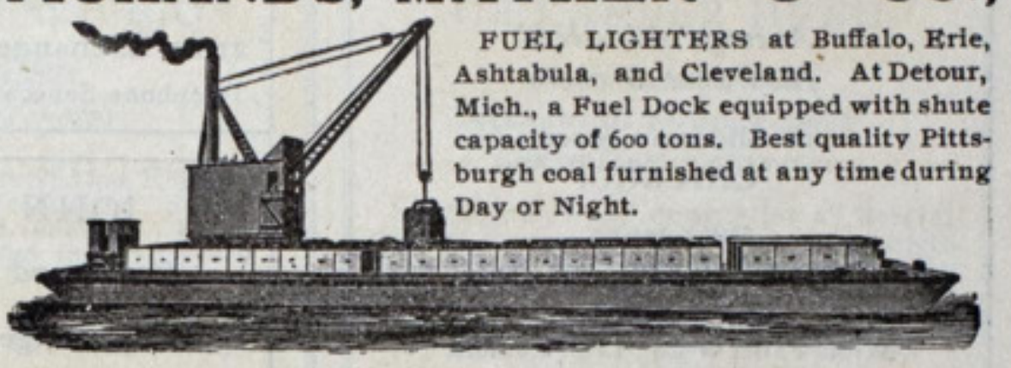

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Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F., & Co.....Boston.

ASBESTO-METALLIC PACKING.

American Steam Packing Co.....Boston.

ASH EJECTORS.

Great Lakes Engineering Works.....Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Brown, Harvey L.....Buffalo.
Faust, Lieut. Wm. H.....Buffalo.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Pinney & Warner.....Cleveland.
Potter & Potter.....Buffalo
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delauney, Belleville & Co.....St. Denis, France.
Detroit Ship Building Co.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Forest City Boiler Co.....Cleveland.
Gogebic Steam Boiler Works.....Duluth, Minn.

BOILER MANUFACTURERS.—Continued.

Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.Oswego, N. Y.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co.....New York.
Newport News Ship Building Co.Newport News, Va.
Northwestern Steam Boiler & Mfg. Co.Duluth, Minn.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co...New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Union Machine & Boiler Co.....Cleveland.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O

BOOKS, NAUTICAL AND ENGINEERING.

Marine Review Pub. Co.....Cleveland.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co.....Philadelphia.
Victor Metals Co.....Braintree, Mass.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.Cleveland.
Macbeth Iron Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

CARPETS, FURNITURE, BEDS, ETC.

Meckes, John.....Cleveland
Siegel, Cooper Co.....New York.
Sterling & Welch Co.....Cleveland.
Williams & Rodgers Co.....Cleveland.

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.

Lebanon Chain Works.....Lebanon, Pa.
Standard Chain Co.....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.
Dake Engine Co.....Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co.....Cleveland.
Potter, J. D.....London.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co.....Boston.
Chelsea Clock Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.
Standard Gauge Mnfg. Co.....Syracuse, N. Y.

COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co (Inc.)....Cleveland.
Lidgerwood Mfg. Co.....New York.
Macbeth Iron Co.....Cleveland.

COMPASS ADJUSTERS.

Fields, Capt. J. M.....Cleveland.

COMPASSES.

Ritchie, E. S. & Sons.....Brookline, Mass.

CONCRETE MIXERS.

Contractors Supply & Equipment Co.....Chicago.

CONDENSERS.

Great Lakes Engineering Works.....Detroit.
Thropp & Sons Co., John E.....Trenton, N. J.

CONTRACTORS SUPPLIES.

Contractors Supply & Equipment Co.....Chicago.

CONTRACTORS FOR PUBLIC WORKS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Long Island City, N. Y.

COURSE FINDER.

Fields' Patent Course Finder.....Cleveland.

CHAIN CONVEYORS, HOISTS.

Brown Hoisting Machinery Co (Inc.).....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

CRANES, TRAVELING.

Brown Hoisting Machinery Co.....Cleveland.
Lidgerwood Mfg. Co.....New York.
Pawling & Harnischfeger.....Milwaukee.

DISTANCE FINDER.

Nicholson Ship Log Co.....Cleveland.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A.....New York.

DREDGING CONTRACTORS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

DRYING APPARATUS.

Sturtevant, B. F. Co.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
United States Ship Building Co.....New York.

Buyers' Directory of the Marine Trade.—*Continued.*

ELECTRIC HOISTS AND CRANES.

General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Pawling & Harnischfeger.....Milwaukee.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Chase Machine Co. .....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros .....Philadelphia.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co.Newport News, Va.
Northwestern Steam Boiler & Mfg. Co.Duluth, Minn.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G.....Buffalo.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Marine Mfg. & Supply Co.....New York.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co..... Chicago.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Mooers & Co., H.....Milwaukee
New York Belting & Packing Co.....New York.
Northwestern Steam Boiler & Mfg. Co.Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander .....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph .....Duluth, Minn.
Lovejoy, H. O. .....Buffalo.
Matteson & Drake .....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.
Powell. Ambrose V.....Chicago.
Rice, Henry .....Buffalo.
Roelker, H. B.....New York.
Sadler, Perkins & Field .....New York.
Steel, Adam .....Cleveland.
Wood, W. J. .....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert .....Buffalo.
Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Ship & Engine Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works .....New York.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironville Dock & Coal Co.....Toledo, O.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburg Coal & Iron Co.....Buffalo.
Smith, Stanley B., & Co.....Detroit.
Smith Coal & Dock Co., Stanley B.....Toledo, O.
Youghiogheny & Lehigh Valley Coal Co....Chicago.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.
Temple Pump Co..... Chicago.

GAUGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co. .....Cincinnati.
Standard Gauge Mfg. Co ..... Syracuse, N. Y.

GAUGES, WATER.

Bonner & Co., Wm. T.....Boston
Lunkenheimer Co ..... Cincinnati, O.
Standard Gauge Mnfg. Co..... Syracuse, N. Y.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GROCERIES AND SUPPLIES.

Siegel Cooper Co.....New York.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.)....Cleveland.
Chase Machine Co.....Cleveland.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....New York.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co .....Bay City.
Pawling & Harnischfeger.....Milwaukee.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co.....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Fleming & Co., P. H.....Chicago.
Frankfort Marine, A. & P. G. Ins. Co....New York.
Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.

INSURANCE, MARINE.—Continued.

McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Peck, Chas. E. & W. F.....New York and Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Voss, F. D.....New York.
Weeks, F. H.....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P.....Chicago.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .....Pittsburg.
Carley Life Float Co.....New York.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson .....Buffalo.

LOGS.

Nicholson Ship Log Co.....Cleveland.
Walker & Sons, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

LUMBER.

Martin-Barriss Co .....Cleveland.
Shurick, F. S. .....New York.

MACHINISTS.

Chase Machine Co.....Cleveland.
Gogebic Steam Boiler Works .....Duluth, Minn.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Mooers & Co., H.....Milwaukee.
Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.
Meckes John..... .....Cleveland
Siegel Cooper Co.....New York.
Sterling & Welch Co. ....Cleveland.
Williams & Rodgers Co., ...Cleveland.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works. ..... Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Ritchie, E. S. & Sons..... .....Brookline, Mass.

Buyers' Directory of the Marine Trade.—*Continued.*

NAVAL ARCHITECTS.
Hynd, Alexander .....Cleveland.
Kidd, Joseph .....Duluth, Minn.
Lovejoy, H. O. .....Buffalo.
Matteson & Drake .....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Sadler, Perkins & Field.....New York.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

OAKUM.
DeGrauw, Aymar & Co.....New York.
Stratford Oakum Co .....Jersey City, N. J.

OIL FOR PAINTING.
Sipe & Co., James B.....Allegheny, Pa.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland

PACKING.
American Steam Packing Co.....Boston.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Katzenstein, L. & Co.....New York.
New York Belting & Packing Co.....New York.
United States Metallic Packing Co....Philadelphia

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Detroit Varnish Co.....Detroit.
Detroit White Lead Works.....Detroit.
Forest City Paint and Varnish Co ..... Cleveland.
New Jersey Zinc Co.....New York.
Sipe & Co., James B.....Allegheny, Pa.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.
Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PILE DRIVING AND SUBMARINE WORK.
Buffalo Dredging Co .....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co...Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simon & Connell Co.....Chicago.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.
Crane Co. .....Chicago.
Macbeth Iron Co. .....Cleveland.

PLANING MILL MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.
Bourne-Fuller Co. .....Cleveland.
Otis Steel Co ..... Cleveland.

PNEUMATIC TOOLS.
Allen, John F.....New York.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.

PRESSURE REGULATORS.
Kieley & Mueller .....New York.
Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.Newport News, Va.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Risdon Iron Works .....San Francisco.
Roelker, H. B.....New York.
Sheriffs Mfg. Co.....Milwaukee.
Superior Shipbuilding Co.....Superior, Wis.
Thropp & Sons Co., J. E.....Trenton, N. J.
Trout, H. G.....Buffalo.
United States Ship Building Co.....New York.

PROJECTORS, ELECTRIC.
Bogue, Chas. J. ..... New York.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F., Mfg. Co.....New York.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks..Oswego, N. Y.
Temple Pump Co..... ..Chicago.

PUNCHES, RIVETERS, SHEARS.
Allen, John F.....New York.

RANGES.
Russell & Watson .....Buffalo.

REFRIGERATING APPARATUS.
Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping..New York.

REPAIRS—ENGINE AND BOILER.
(See also Boiler Manufacturers and Engine Builders.)
Gogebic Steam Boiler Works.. ..... Duluth, Minn.
Marine Iron Co..... ... Duluth, Minn.
Forest City Boiler Co..... Cleveland.

RIVETING MACHINES.
Allen, John F.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crane Co. .....Chicago.
Hayden Mfg. Co., N. L.....Columbus, O.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.
See Wrecking Companies.

SEARCH LIGHTS.
Bogue, Chas. J. ..... New York.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.
See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.
Otis Steel Co. ..... Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.Newport News, Va.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Shipowner's Dry Dock Co.....Chicago.
Smith & Son, Abram .....Algonac, Mich.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Marine Mfg. & Supply Co..... ... New York.
Upson-Walton Co.....Cleveland.

SHIP LANTERNS AND LAMPS.
Russell & Watson .....Buffalo.

SHIP TIMBER.
Martin-Barriss Co. .....Cleveland.
Shurick, F. S.....New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.
Smooth-On Mfg. Co.....Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR, SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.
Elwell, Jas. W. & Co.....New York.
Gilchrist & Co., C. P.....Cleveland.
Holmes, Samuel .....New York.
McCarthy, T. R.....Montreal, Can.
Weeks, F. H.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line.....New York.
International Mercantile Marine Co....Philadelphia.
Red Star Line .....New York.
United Fruit Co ..... Boston.

STEEL CASTINGS.
Macbeth Iron Co.....Cleveland.
Otis Steel Co. ..... Cleveland.
Seaboard Steel Casting Co.....Chester, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Marine Mfg. & Supply Co.....Cleveland.
Moulton Steering Engine Co.....New York.
Pawling & Harnischfeger .....Milwaukee.
Sheriffs Mfg. Co. .....Milwaukee.

SUBMARINE DIVING APPARATUS.
Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.
Gaskin, Edward .....Buffalo.
Hynd, Alexander .....Cleveland.
Lovejoy, H. O. .....Buffalo.
Matteson & Drake .....Philadelphia.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

TESTS OF MATERIALS.
Hunt, Robert W. & Co.....Chicago.
Pittsburg Testing Laboratory Ltd.....Pittsburg.

TILING, INTERLOCKING RUBBER.
New York Belting & Packing Co.....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Allen, John F. .....New York.
Watson-Stillman Co. .....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Sturtevant Co., B. F., Jamaica Plain.....Boston.

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TRUCKS.

Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co.....Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
Ashton Valve Co .....Boston.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Mooers & Co., H.....Milwaukee.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co.....Troy, N. Y.

VARNISHES.

Detroit Varnish Co .....Detroit.
Detroit White Lead Works.....Detroit.
Forest City Paint & Varnish Co.. .....Cleveland
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co.....Boston.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co. .....Buffalo.
Elwell, Jas. W. & Co.....New York.
Elphicke, C. W. & Co.....Chicago.
Fleming & Co., P. H.....Chicago.
Gilchrist & Co., C. P.....Cleveland.
Hall & Root .....Buffalo.
Helm & Co., D. T.....Duluth.
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co. .....Cleveland.
McCarthy, T. R.....Montreal.
Mitchell & Co. .....Cleveland.
Prindiville & Co. .....Chicago.
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co.....Chicago.
Weeks, F. H.....New York.

WATER GAUGES.

Bonner & Co., Wm. T .....Boston
Lunkenheimer Co.....Cincinnati, O.

VESSEL FURNISHINGS.

Meckes, John .....Cleveland
Siegel Cooper Co.....New York.
Sterling & Welch Co. .....Cleveland.
Williams & Rodgers Co., ...Cleveland.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co. .....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co. .....Cincinnati.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Marine Mfg. & Supply Co ....New York.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co..Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & Dry Dock Co....New York.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
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Drein, Thos. & Son.....Wilmington, Del.
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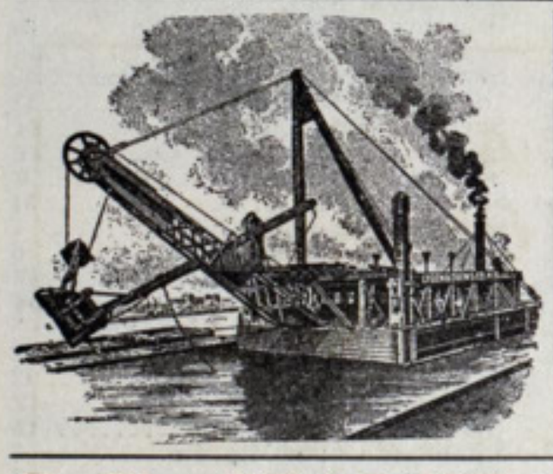

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No. 28, N Y & Bost Ex....	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	†10:00am	†10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 48, Ac via Sandusky..	†1:40pm	.. ....
No. 44, Cleve. & N. Y Sp.	.....	*3:00pm
No. 46, Southwestern Ex.	....	*3:10pm
No. 116, Conneaut Accom	.....	†4:30pm
No. 6, Lim Fast Mail....	*5:40pm	*5:45pm
No. 26, 20th Cent Lim.....	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex.....	*10:30pm	*10:35pm
No. 2, Day Express.....	†9:10pm	†9.25pm
No. 126, Norwalk Accom.	†8:10am	.....

Westward.	Arrive from East.	Depart West.
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No. 7, Day Express.....	.....	†6:00am
No. 15, Bost & Chi Sp.....	*3:05am	*3:15am
No. 19, Lake Shore Lim..	*7:05am	*7:15am
No. 23, Western Express.	*10:30am	*10:35am
No. 29, Southwestern Sp.	‡11:10am	.....
No. 33, Southwestern Ex	*12:25pm	.... ..
No. 133, Cleve & Det Ex..	.....	*12:45pm
No. 47, Accomodation.....	†11.00am	†3:00pm
No. 141, Sandusky Accom.	.....	†3:10pm
No. 43, Fast Mail	*4:35pm	*4:40pm
No. 127, Norwalk Accom..	.....	†5:10pm
No. 37, Pacific Express...	*6:50pm	*7:20pm
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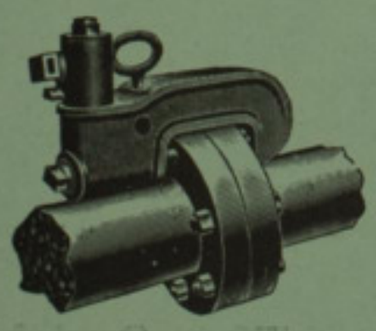

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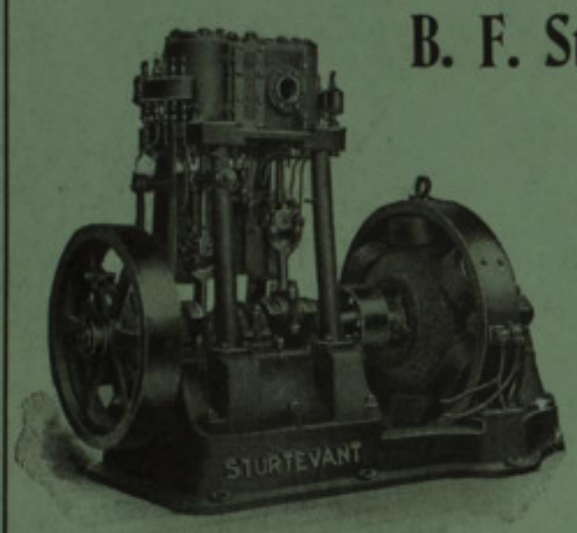

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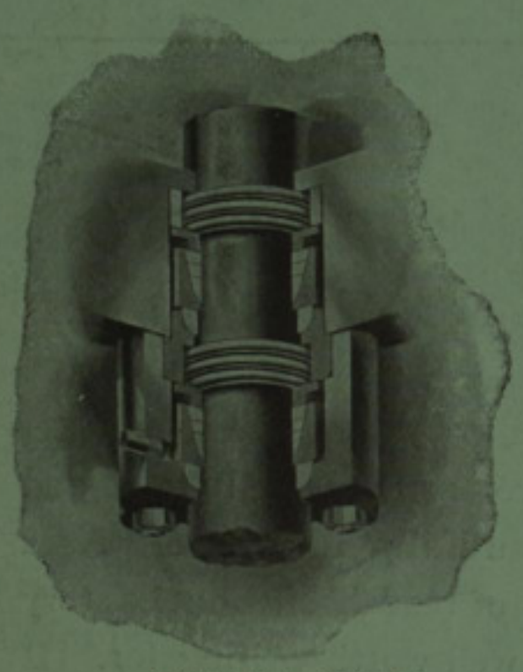

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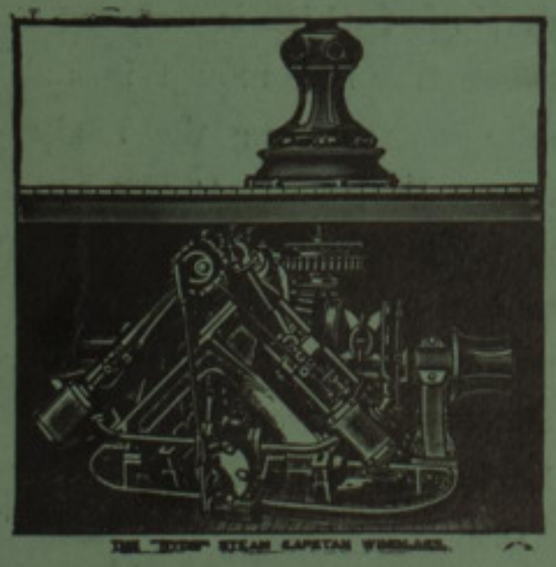

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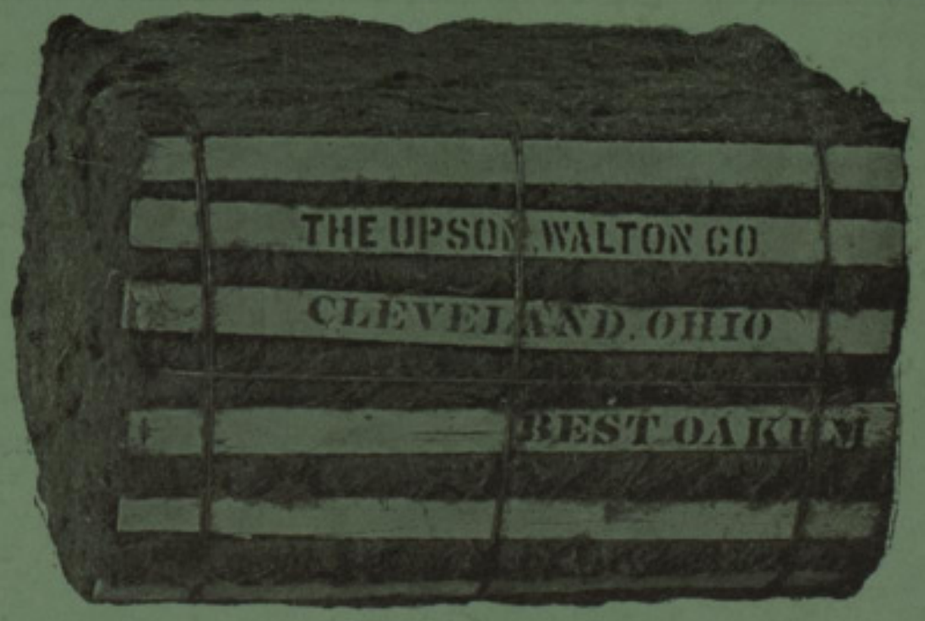

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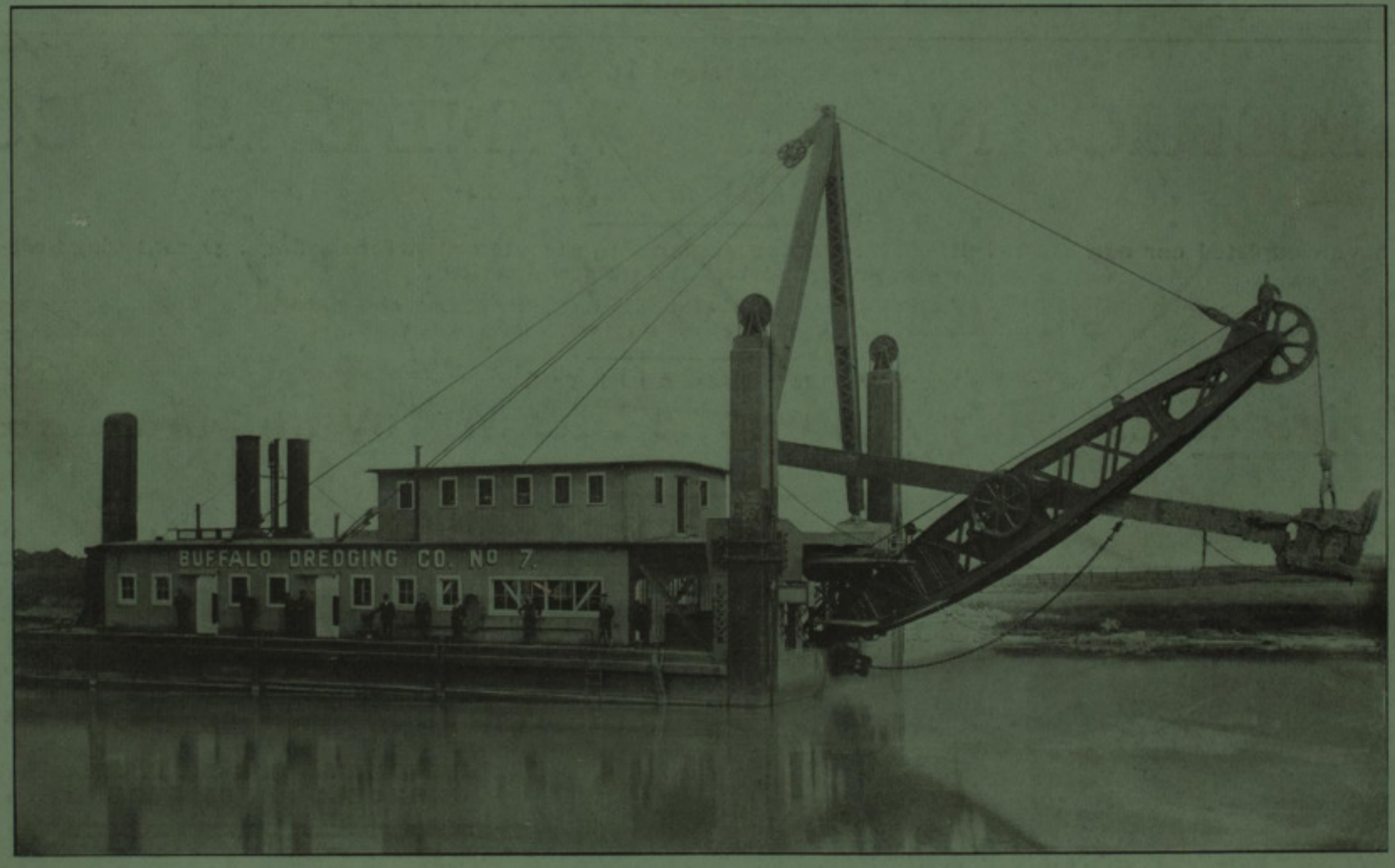

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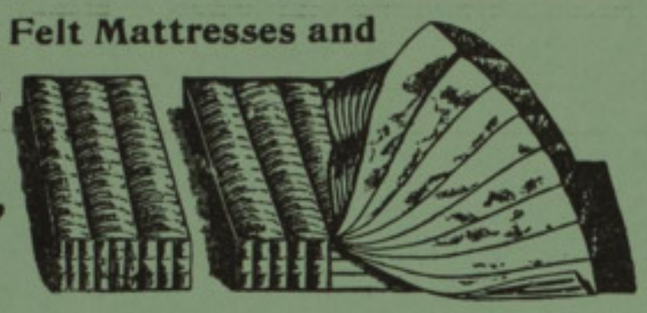

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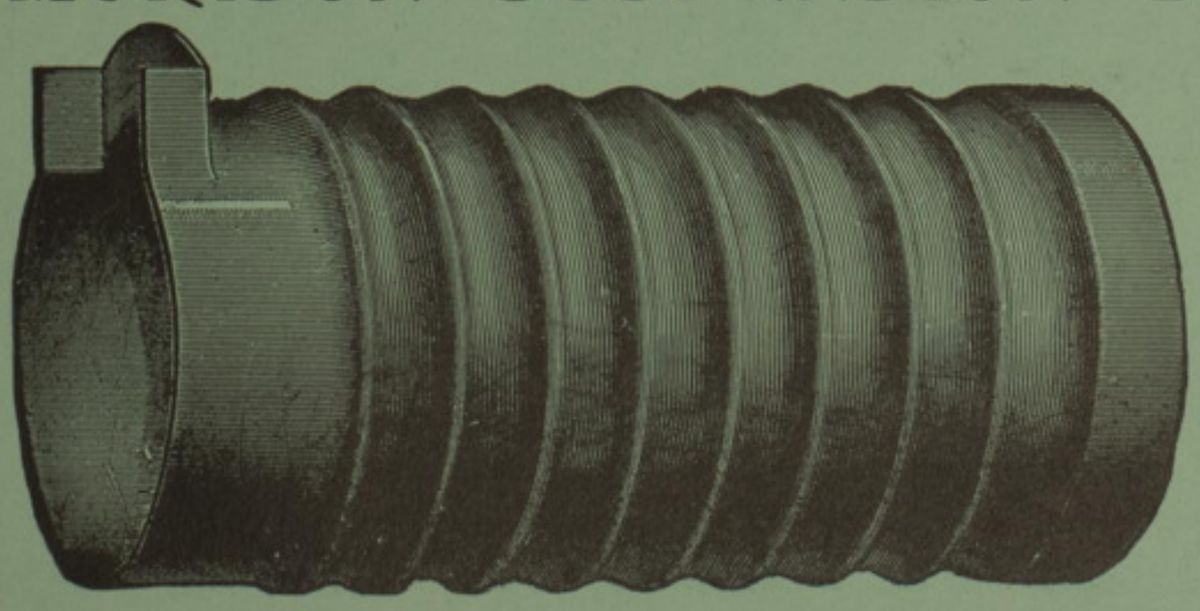

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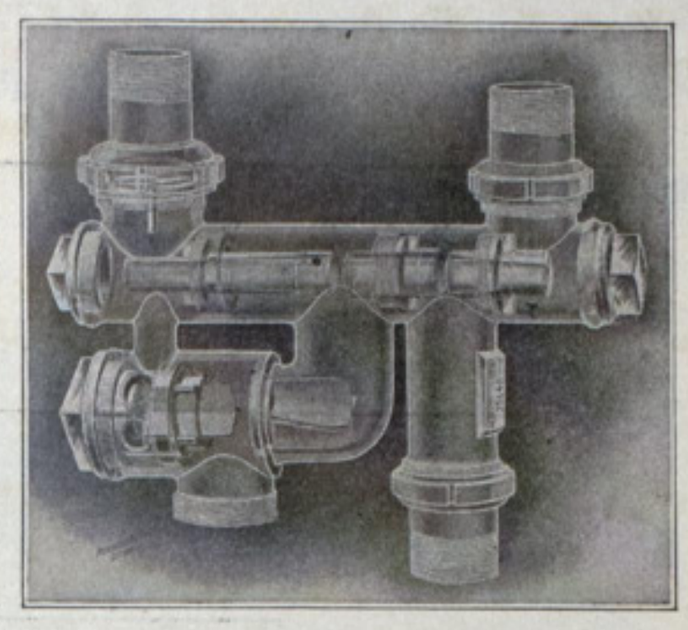

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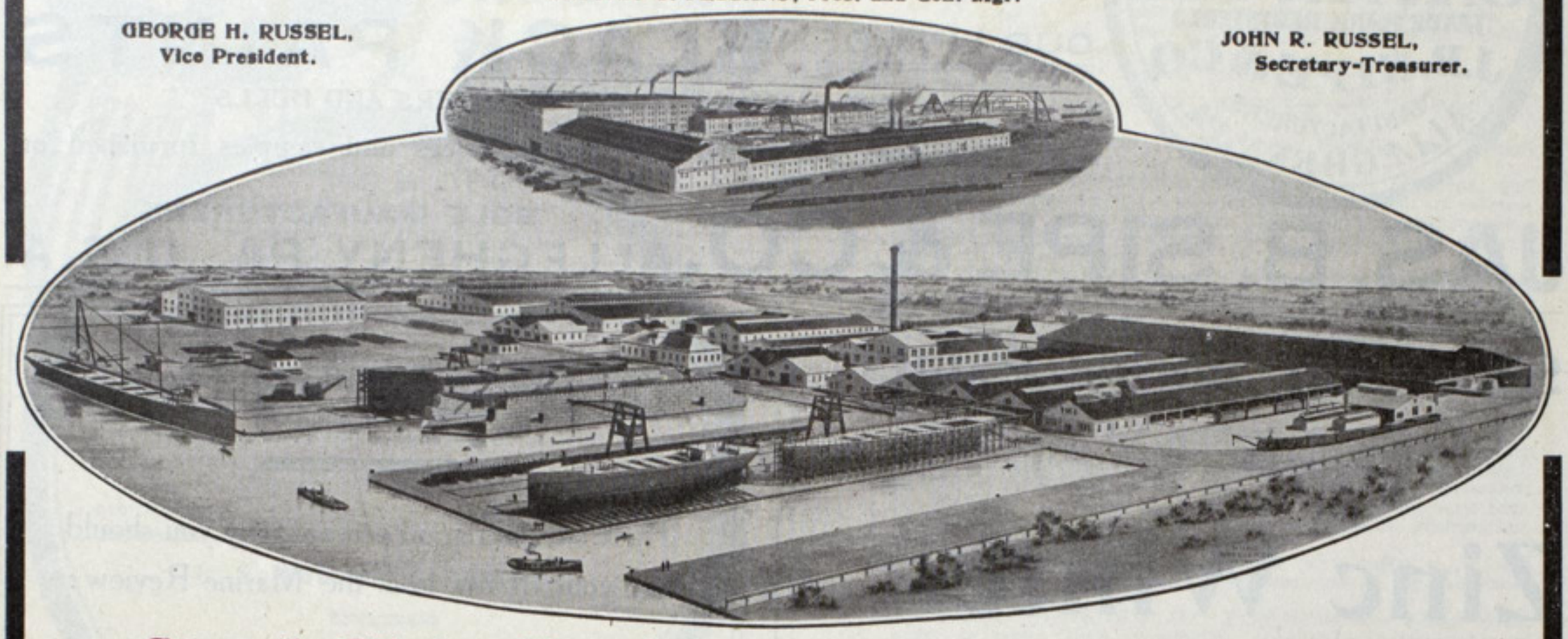

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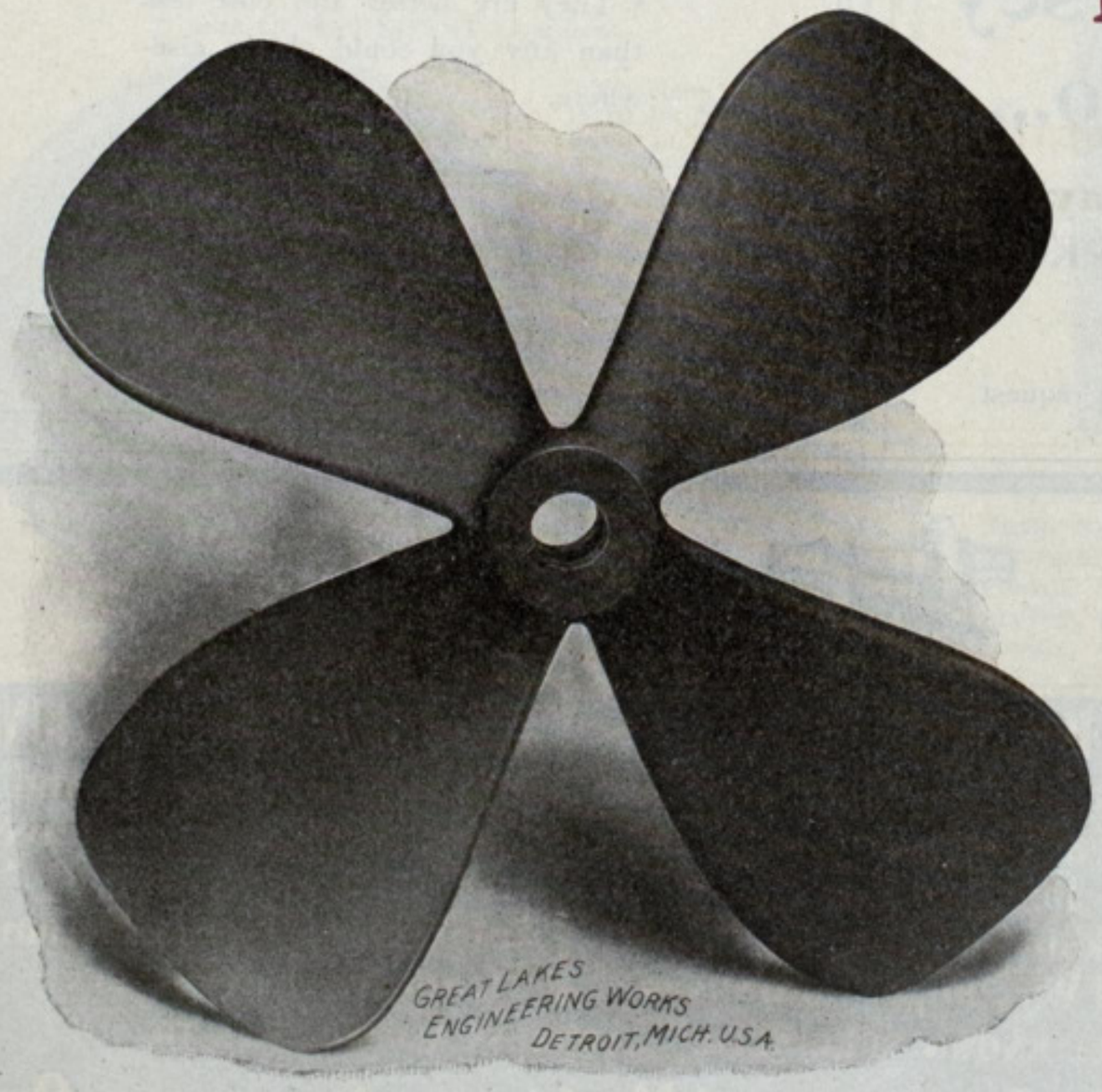

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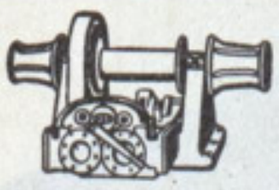

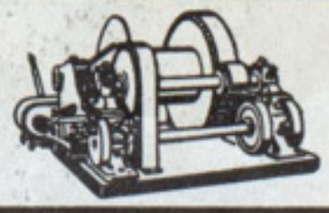

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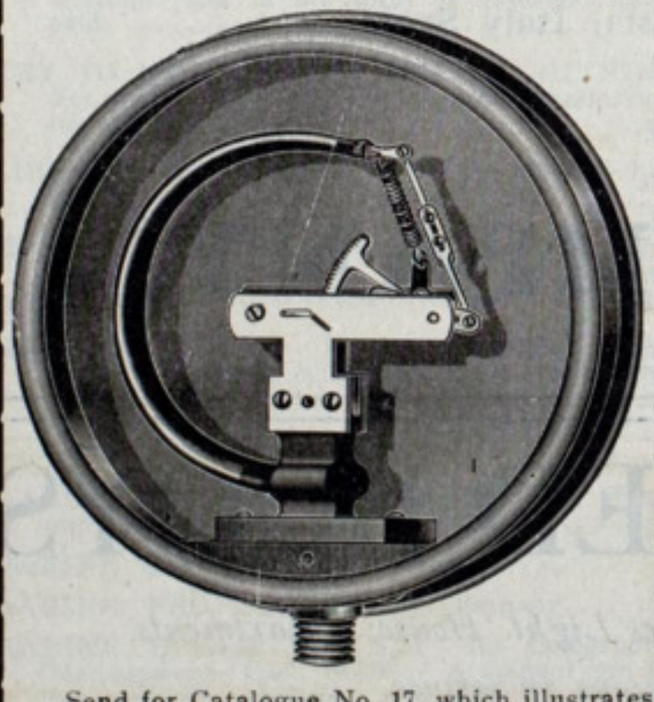

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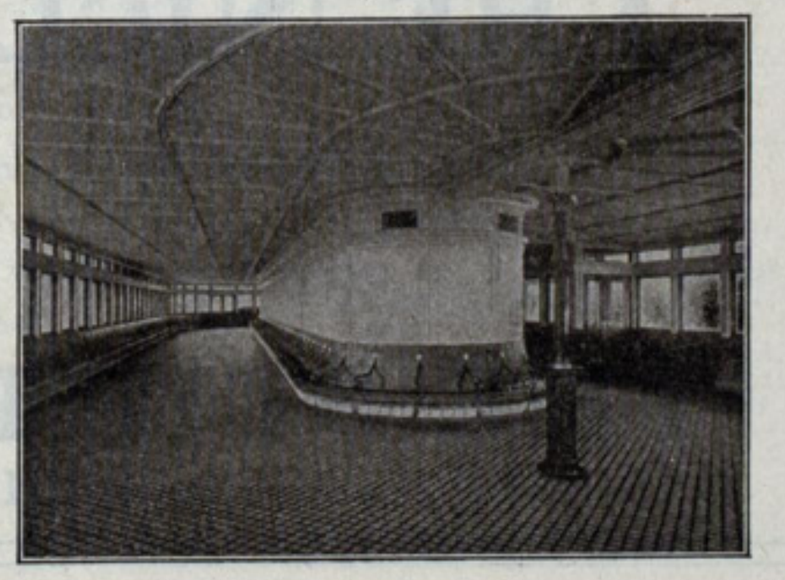

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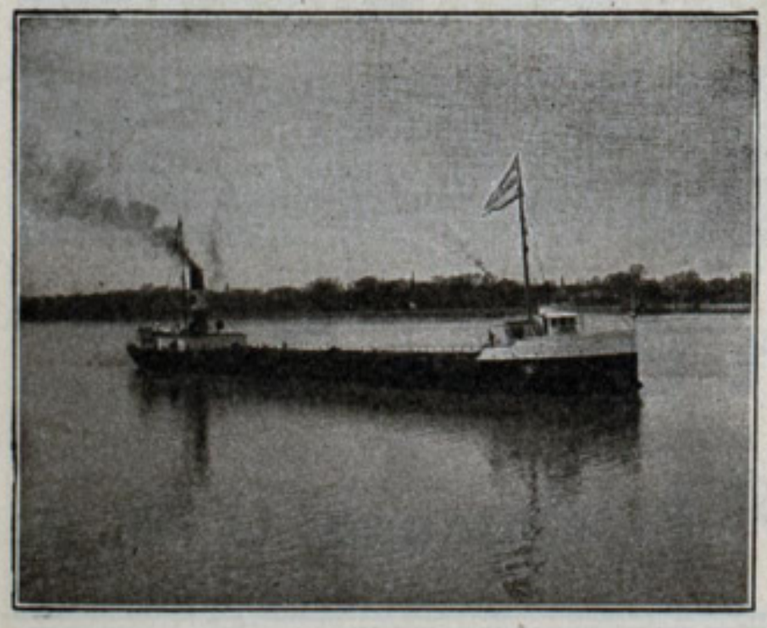

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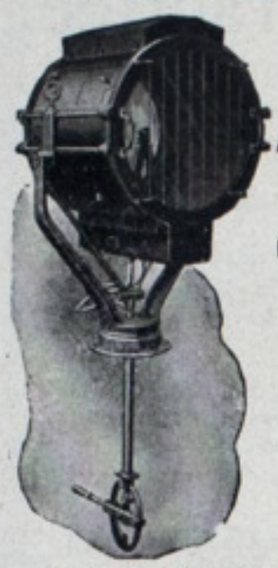

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